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VETERINARY MEDICINE

SEPTEMBER 1942

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No. 9

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VETERINARY MEDICINE

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Researchers at the University of California report that a deficiency of the vitamin B complex member, pantothenic acid, causes color loss in feathers of chickens.

Sulfa drugs are saving 75 out of every 100 patients stricken with influenzal meningitis, according to surveys reported to the Journal of the American Medical Association (June 27). Before the introduction of these drugs the mortality from this disease had been practically 100%.

Florida cattle may be much benefited by the discovery of the U. S. Bureau of Entomology that the common stable fly, *Stomoxys calcitrans,* which has proved such an intolerable pest among cattle in the south, breeds in the windrows of fermenting aquatic vegetation along the shores of bayous and backwaters. Because these flies have threatened to disrupt the aviation training program along the northwestern Gulf Coast of Florida investigation has been made by the U. S. Department of Agriculture and the U. S. Public Health Service as to methods of eradication.

Arsenical insecticides, or creosote oil (diluted in light diesel fuel oil) were sprayed from barges operating in the shallow waters. A single application was found to be effective against larvae and eggs and discouraging to the adult fly.

It has been found by the U. S. Army that sheepskin is the warmest of all furs.

Before the war one ranch, the Parker Ranch in Hawaii, maintained 3,000 horses, and at that time there were 300 horses assigned to the Division Pack Train at Schofield Barracks.

The Biochemical Research Laboratories of Newark, Delaware, report a new chemical remedy, H-1 to be effective against the gram-positive group of bacteria. It is somewhat like gramicidin and like it is extracted from soil bacilli. H-1 is a fine gray powder. It is soluble in a small amount of alcohol and when diluted with water makes a colorless solution which is not only bacteriocidal but it stimulates healing and is effective in high dilutions.

The U. S. National Institute of Health reports that a single injection of sulfadiazine or sulfathiazole saved 50% of mice inoculated with enough of the deadly Asiatic cholera germs to kill 90 out of 100 untreated animals within 24 hours. The drugs were effective whether given subcutaneously or internally.

Anticholerin (anticholera vaccine), required to be given to all U. S. soldiers likely to serve in cholera infested areas, gives immunity for about a year.

"Keep 'Em Healthy"

The slogan advocated by Secretary of Agriculture Wickard in the 1942 Yearbook of the U. S. Department of Agriculture "Keeping Livestock Healthy," now ready for distribution, is "Keep 'em Healthy."

Although dealing extensively with the treatment of sick and injured animals, it places emphasis on means by which veterinarians and stock owners may prevent disease, including those caused by infectious organisms, insects and other parasites, malnutrition and other causes.

Included in this volume are 98 articles covering practically every livestock disease. It is divided into nine parts which are: Fundamentals of Disease and Insect Control; Important General Diseases Common to Several Species; Common Diseases and Parasites of Horses and Mules; Diseases and Parasites of Cattle; Diseases and Parasites of Swine; Diseases and Parasites of Sheep and Goats; Common Diseases and Parasites of Poultry; Common Diseases and Parasites of Dogs and Cats and Wildlife Diseases and Parasites. In addition control methods for these diseases, so far as known, are discussed.

"Keeping Livestock Healthy" will be of special value this year because of the urgent need to conserve the health of animals on capacity stocked farms and ranches—to insure an adequate food supply for a world at war. The new volume is expected to be a "best seller" in its field.

Veterinarians and research workers will find the book comprehensive and authoritative. Many of the articles contain references to original experimental data for those who wish to delve more deeply into the various subjects.

Dr. John R. Mohler, Chief of the U. S. Bureau of Animal Industry, headed the committee of 11 specialists who supervised the preparation of this yearbook. It is largely to his credit that it is so all-inclusive with regard to animal diseases and their control.

The volume contains 1,238 pages, cloth bound, $1.75, and is available from the Superintendent of Documents, Government Printing Office, Washington, D. C.

★ ★ ★ ★

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

★ ★ ★ ★

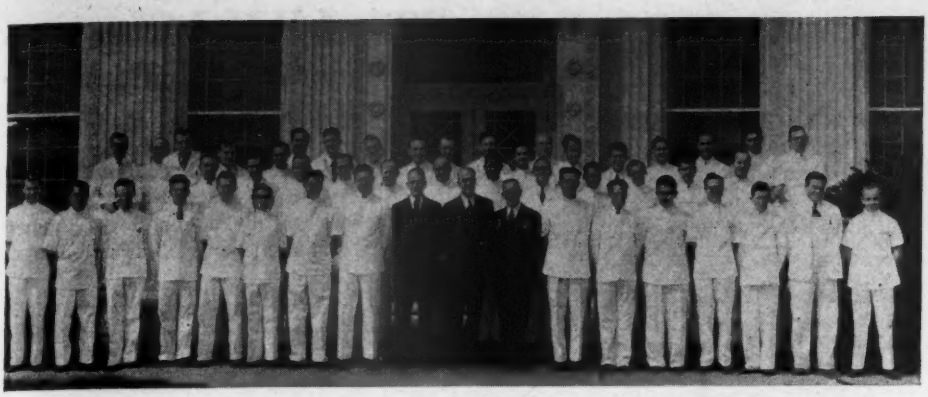
Standardized Biological Products Urged to Step-up War on Diseases[1]

Standardization of biological products, through international cooperation, should greatly enhance the effectiveness of disease control in cooperating countries. Various animal diseases, including tuberculosis, rabies, and anthrax, are transmissible from the lower animals to man and it is important that vaccines and other biological products including agents for the detection of disease meet international standards of purity and potency.

The health of livestock is a fundamental requirement in efficient production. During the present war, there is a particular need to control animal diseases, first, to prevent interference with food-production programs and, second, to develop supplies of breeding animals for restocking pillaged countries.

Effective veterinary planning must be based on adequate knowledge of the causes of diseases and their characteristics. In countries free from certain diseases, efforts should be made to guard against their introduction. A free exchange among countries of information concerning livestock plagues and means of combating them is of mutual advantage. The United States is prepared to make such information available to foreign officials and stockmen and this country, in turn, welcomes the results of their research and experience.

[1] From an address by Dr. Adolph Eichhorn, Director, Bureau of Animal Industry, Animal Disease Research Center, Beltsville, Md., at the Second Inter-American Conference of Agriculture, Mexico City, July 16, 1942.



GRADUATING CLASS, 1942, AND FACULTY MEMBERS; SCHOOL OF VETERINARY MEDICINE, TEXAS A. AND M. COLLEGE

First row, left to right (graduates and faculty members): Robert F. Locke, Minol Ota, Robert B. Caraway, William W. Merritt, Harold Shanzer, Olaguibeel A. Lopez y Pacheco, Harry H. Lutz, Rufus R. Norton, Dr. Fred P. Jaggi, Jr., Dr. August A. Lenert, Dr. Ralph C. Dunn, William A. Boney, Jr., David M. Bandy, Sydney M. Kessler, George P. Bertetta, Edward L. Lepon, Victor W. Michaels and George L. Mueller, Jr.

Second row, left to right: Melvin P. Roberts, Robert B. Leathers, Charles A. Mohr, Jr., Thomas J. Grennan, Jr., Frank H. Caldwell, Virgil W. Bird, Luciano B. Herrera, Robert M. Lynn, Julio A. Echegaray y Arana, Donald C. Dunnet, Cecil B. Ragland and Charles V. Isaac

Third row, left to right: Ray J. Foshee, Martin Kagan, Harry R. McKinney, William C. Moughon, Irving E. Sall, Martin McBride, Jr., John W. McCoy, Kenneth J. Paley, Jefferson D. Wilcoxon, Carl R. Watson, Arthur A. Miller, Milton Regenbogen, Albert D. Fishman, William T. Shalkop, Irwin P. Blum, Eugene S. Hobert, Sam S. Kreuz, Ralph W. Bennett and James W. Wolfe

Government Loans Available to Veterinary Students

Congress has made available $5,000,000 for financial aid to students pursuing accelerated courses in certain technical and professional fields considered essential for national defense. Included in this category are students pursuing studies in engineering, physics, chemistry, medicine (including veterinary medicine) dentistry and pharmacy, whose technical or professional education can be completed within two years. The chairman of War Manpower Commission will determine the number of such students to be assisted by loans and the Commissioner of Education will promulgate regulations and administer the loan, dependent upon approval by the chairman of the War Manpower Commission. Those receiving assistance must maintain a satisfactory standard of scholarship and must agree in writing to engage, for the duration of the wars in which the United States is now engaged, in such employment or service as may be assigned to them by officers or agencies designated by the chairman of the War Manpower Commission.

The above loans are to be made by educational institutions from funds paid to them out of the federal appropriation.

Loans will be made in amounts not exceeding tuition and fees plus $25 per month, nor more than a total of $500 for any one student during a twelve-month period.

If students, accepting such loans, are called into military service during the present wars before completing their courses or if they suffer total or permanent disability or death, the loan is canceled.

★ ★ ★ ★

Correction

In line three of the first paragraph beginning on page 335 of the August issue of VETERINARY MEDICINE the word "carbonate" should read "bi-carbonate." Get your August copy and make the change *now* please.

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

The 84th annual meeting of the American Dental Association scheduled to convene in Boston, August 24-28, has been "postponed for the duration."

The board of trustees voted postponement in order "to avoid placing further burden on the nation's facilities needed for the war effort." More than 10,000 dentists had been expected to attend.

* * * *

Isolation Ward for Dogs Opened at Angell Hospital

An air-conditioned modern (the John R. Macombes Ward) isolation ward, containing 64 translucent glass kennels with wire fronts, was dedicated at the Angell Memorial Hospital, Boston, April 30. A new and unique feature is that of an ultra-violet electric sterilizing lamp under which every person, before entering the ward and again upon leaving, must stand for about a minute.

79th A.V.M.A. Meeting

Palmer House, Chicago

AUGUST 24-27, 1942

The 79th annual meeting of the American Veterinary Medical Association will be held in Chicago at the Palmer House, August 24 to 27, which is a week later than at first scheduled.

The program will not be materially changed from the one originally planned when it was expected that the meeting would be held in the Stevens Hotel.

* * * *

The newcomer in the field of research by his failure to become thoroughly acquainted with past efforts often finds himself spending much time and energy in the study of a problem that needs no further elucidation.

—Courtesy *Our Dumb Animals*

Interior view showing translucent glass cages with wire fronts in new isolation ward at Angell Memorial Animal Hospital

Insect Borne Vaccine

A new epidemiologic approach is suggested in recent attempts by Hammon and his associates[1] of the Hooper Foundation, University of California, to reproduce the natural mode of infection of horses with St. Louis encephalitis virus. A widespread infection of horses and other animals of the Pacific Coast with St. Louis encephalitis is apparent from numerous serologic surveys. Titrations of 69 horse bloods from western states, for example, showed 49 (70%) of the bloods containing antibodies of sufficiently high titer to neutralize the St. Louis virus in vitro. Cox and his coworkers[2] had previously found that horses without such antibodies developed typical encephalomyelitis on intracerebral injection of the St. Louis virus, while antibody containing horses were immune to such injection. Horses convalescent from the experimental intracerebral inoculation invariably developed relatively high titer specific antibodies against the virus. During the terminal phase of experimental disease the virus was occasionally isolated from nasal washings but was never demonstrated in the circulating blood. Contact with nasal secretions, therefore, was the only method of spread of this disease suggested by the earlier investigators.

A different method of spread, however, was indicated by the repeated isolation[3] of the St. Louis virus from one species of mosquitoes (Culex tarsalis) of the Yakima Valley, Washington, all other biting insects of this region being negative. This strongly suggests that culex transmission is the main factor in bringing about the wide dissemination of the virus among wild and domestic animals of western states.

To test this possibility a number of wild, unbroken colts were imported from an uninhabited mountainous region of Nevada, an area statistically free from the St. Louis virus. The serums of these horses were free from homologous antibodies at the time of their importation. St. Louis virus isolated from Yakima mosquitoes was used for the inoculation tests and employed in its first and second mouse brain passage. Each brain was emulsified in ten volumes of broth containing 5% of sheep serum. Certain horses were given 3cc of the resulting virus suspension intranasally. Others were inoculated subcutaneously (very superficially) with 3cc of a 1:10,000 dilution of the same suspension, the dose being planned to approximate a possible single mosquito inoculation. Control horses were inoculated intracerebrally with the suspension, with a number of uninoculated controls kept in a separate corral.

Hammon has repeatedly isolated the St. Louis virus from *Culex tarsalis*—a common mosquito in the Yakima Valley and widely distributed in the Western States. It has been found as far east as Illinois. In temperate regions females hibernate in sheltered places, emerging in the spring to begin egg laying. The larvae develop in permanent ponds, irrigation seepage, barnyard drainage and sewage. *C. tarsalis* has been observed to feed indiscriminately on man, horses, mules, cows and domestic fowls.

Bleedings were begun with all horses twelve hours after the inoculaion and continued twice daily for fifteen days. Nasal washings were made once daily. Virus was not isolated from the nasal washings of any horse; neither was elevation of temperature or other sign of illness noted in any horse. In a typical case of a horse inoculated subcutaneously, the St. Louis virus was isolated from the circulating blood twenty-six, thirty-six and forty-eight hours after inoculation, after which the blood became sterile. By the end of twenty-two days all inoculated animals had developed high titer antiserums. The Hooper Institute bacteriologists believe that their subcutane-

[1] Hammon, W. M.; B. H. Carle and E. M. Izumi: *Proc. Soc. Exper. Biol. & Med.*, 49:335 (March) 1942.
[2] Cox, H. R.; C. B. Philip and J. W. Kilpatrick: *Pub. Health Rep.*, 56:1391 (July 4) 1941.
[3] Hammon, W. M.; W. C. Reeves; B. Brookman; E. M. Izumi, and C. M. Gjullin: *Science*, 94:328 (Oct. 3) 1941.

ous test represents the essential features of the usual method of spread of this disease, a symptomless, "inapparent" or subclinical infection due to an insect carrier, an infective concentration of the virus being present in the blood stream during the first forty-eight hours, permitting infection of other blood sucking insect vectors. In none of their experiments did the mosquito borne virus manifest sufficient neurotropic tendencies to produce clinical symptoms of encephalitis, although it did produce typical encephalitis on intracerebral inoculation into mice.

If this work is adequately confirmed, it would seem reasonable to conclude that the wide dissemination of antibodies in wild and domestic animals of the Pacific Coast is due to an insect borne subneurotropic virus producing a subclinical septicemia. The insect borne virus would then function as a specific vaccine, immunizing the animal population against clinical types of the disease. Whether or not the St. Louis virus is modified in its virulence or specificity by insect passage has not yet been determined.—*Jnl. A.M.A.* 119:10, pp. 797-8.

* * * *

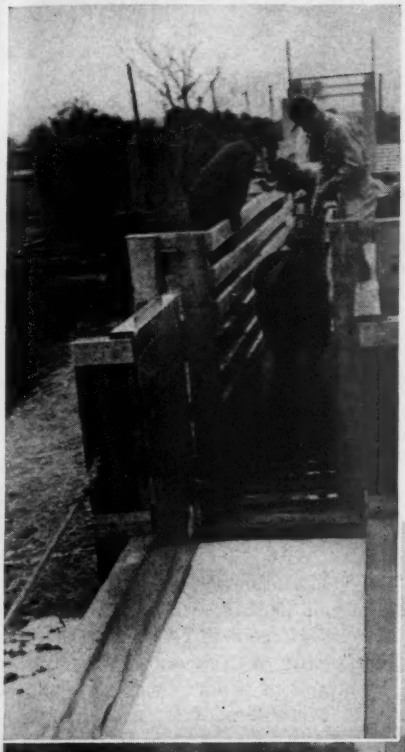
Intraperitoneal Administration of Sulfanilamide

Animal experiments of Key and Burford, Jensen, Johnsrud and Nelson, Key and Frankel have demonstrated that local application of sulfonamide drugs does not interfere with the healing of bones, muscles, connective tissue, joints, pleura and peritoneum. Introduction of sulfonamide drugs into the normal peritoneal cavity of mice (Throckmorton) caused a gradual increase of mononuclear phagocytes of the type elicited by only the mildest of irritants. Rae found, in his studies on experimental peritonitis in rabbits, that sulfanilamide is most effective in the preperitonitis stage. Rosenburg and Wall concluded from their experiments on rats that sulfanilamide is not irritating to the peritoneum and apparently is not harmful to the human body. Pearl and Ricketts, by intraperitoneal use of sulfathiazole, controlled peritonitis produced in the rat by inoculation of a pure culture of hemolytic Escherichia coli. In the experiments of Harbison and Key, local application of sulfanilamide did not appreciably delay the healing or decrease the tensile strength of a wound or tend to cause peritoneal adhesions.

Ravdin, Rhoads and Lockwood reduced the mortality rate of 1.5% in a series of 880 consecutive cases of acute appendicitis to that of 0.4% in a series of 257 cases by instituting sulfanilamide therapy of cases in which there was spreading peritonitis.

Thompson, Brabson and Walker treated 59 cases of acute, diffuse appendical peritonitis by placing 8gm of sulfanilamide into the peritoneal cavity and 4gm in the layers of the abdominal wall. In cases of appendical abscess they considered it safe to use as much as 20gm total of the drug. Among these 59 cases some seemed hopeless. From 1935 to 1939 741 cases of acute suppurative appendicitis were treated at the Roosevelt Hospital, New York City, with twenty deaths, a mortality rate of 2.7%. During 1940 with intraperitoneal sulfanilamide therapy there were 204 consecutive cases in which operations were performed without a fatality. The dramatic reduction in mortality rate in 1940, the authors felt, was directly due to sulfanilamide. Kinney operated in 45 cases of generalized peritonitis with only one death. Some of the cases were of the gravest type. Toxic effects were not noted. The improvement in the results, the author felt, was due to the use of sulfanilamide in the peritoneal cavity. A local concentration of from 75 to 100 times higher than systemic concentrations may be obtained by direct application of sulfanilamide at the source of infection, according to Mueller and Thompson. They placed 10gm of the drug in the peritoneal cavity and sprinkled 5gm in the layers of the abdominal wall. This, they believe, increased the rapidity of wound healing in cases of purulent infection.

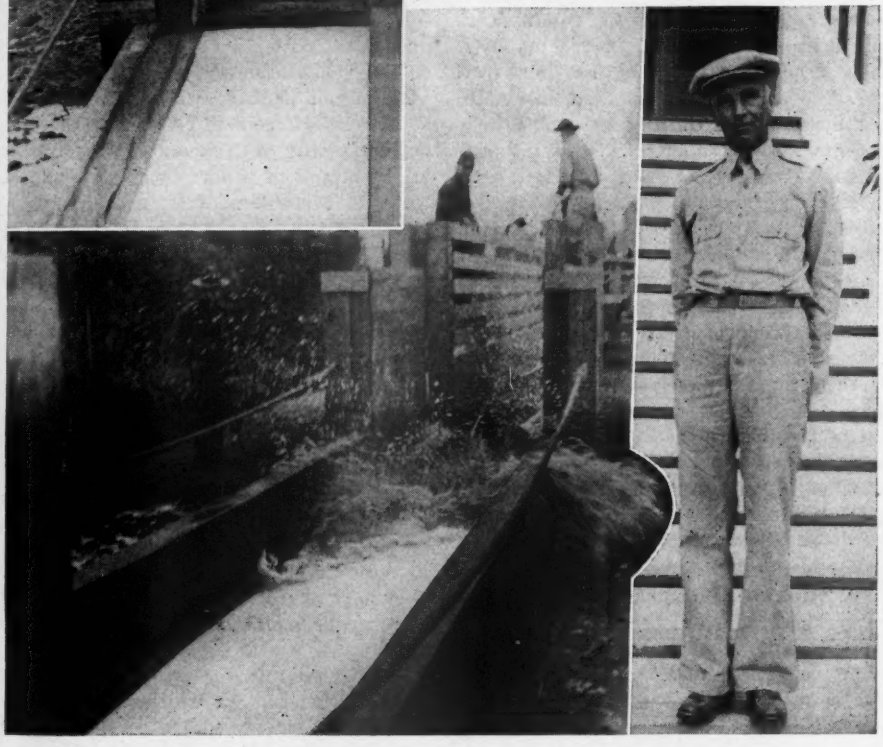
The mortality rate for 742 surgical cases of acute appendicitis between 1935 and 1939 at the Roosevelt Hospital amounted to 2.83%. With sulfanilamide since January, 1940, there have been 400 consecutive surgical cases of acute appendicitis at the Roosevelt Hospital without a death.—*Jnl. A.M.A.* 119:10, pp. 796-7.



RINGWORM IN HORSES

Ringworm is a parasitism of minor importance among civilian owned animals. Among military animals it sometimes spreads with astonishing rapidity. For example—a shipment of horses, in which only one or two appear to have a slight infection when loaded on the train may arrive at their destination a week later, in advanced stages of the disease, with great areas of the body surface denuded and raw. This, notwithstanding text-book statements that the incubation period of ringworm is one to four weeks. The explanation probably lies in the wide distribution of Trychophyton spores in the coats of the animals, awaiting only intimate contact, heat, and moisture to set off an explosive growth.

Once, in recent years, ringworm was responsible for more "days lost" by army animals, than any other disease. Last year it was fourth in the list, only strangles, influenza and rhinitis, among the infectious diseases, having caused a greater number of days of unserviceability among army animals. Only abrasions and wounds among traumatic ailments, caused more lost time. It has persisted at one post for several years despite as many as 30,000 hand treatments in a single year. It is easily eradicated from a command by dipping



FIRST USE OF THE DIPPING VAT AT FORT BROWN, FEBRUARY 1939

This vat was constructed by Col. C. C. Whitney at the time Station Veterinarian at Fort Brown. His likeness in golfing costume appears at the right. At the upper left a horse is shown just before the plunge. From the surface of the liquid the concrete inclines sharply downward and has no cleets. The animal once stepping upon it has no choice but to slide into the vat as shown. Some army dipping vats are constructed with a wooden platform supported across the middle—a teeter board arrangement onto which the animal is driven and by which it is dumped into the vat about four feet below

Chemical Warfare;
Its Effect on Army Animals and Food

AT the present writing but slight use has been made of poisonous and suffocating gases in the current conflict, but there appears to be good ground for the belief that before this war is over such agents will be used on a far greater scale than ever before. All major combatants have prosecuted research into chemical warfare continuously since World War I and it is known that at least two of the Axis governments have accumulated enormous stocks of chemical warfare agents.

Chemical agents may be used (1) directly against enemy personnel, (2) to contaminate his food supply and, (3) against his animal transport to hamper his mobility. When used effectively against his own forces the employment of chemical agents for the second and third of these objectives concerns the veterinary officer in his professional capacity as food inspector and conservator of animal efficiency. The first concerns him as it does other officers personally, and also as commander of detachments and organizations. However his duties in the decontamination of foods and in the treatment of injured animals require that he possess a knowledge of the methods for the protection of personnel from the effects of chemical warfare equivalent to that of the medical officer. Hence the veterinary officer's responsibilities, when chemical agents are employed in warfare, are varied and important; and a comprehensive knowledge of the subject is required of him.

It is generally assumed that no new gases, that is, gases which were not used in the previous war, will be largely employed in this one. It is not a safe assumption for if the use of hitherto unutilized poisons were planned by any combatant, of course it would be kept a carefully guarded military secret. So far as the well-known gases are concerned their effect in rendering food, water, and forage supplies unpalatable or harmful is only incidental to their use against personnel and animals. The effectiveness of high explosive and incendiary bombs in the destruction of stored food and forage or of biologic agents and poisons (not ordinarily classed as chemical warfare agents) against water supplies, is such as to render unlikely chemical warfare directed primarily against either food or water supplies.

However if poisonous and suffocating gases, including readily diffusible liquids and finely divided solids, should be used in the manner now commonly discussed—that is by spraying them from low-flying airplanes in quantities never before envisioned —it is inevitable that food and forage supplies in the possession of troop organizations will be contaminated. Supplies stored in buildings or packaged in wooden or metal containers will seldom be endangered. Food or forage will be damaged but rarely, if at all, by poisonous vapors except it is exposed for a considerable period to arsenical fumes. It will require decontamination or to be destroyed only if liquid poisons have been splashed upon it.

From experience with chemical warfare in World War I it is apparent that only mustard gas and agents containing arsenic are likely to be of importance as food or forage contaminants. Considering the forage first; dry hay and grain are peculiarly resistant to the effect of fumes from these agents and the slight contamination possible can be removed by washing, or if the water supply is limited, by even a small amount of sodium carbonate solution. Or they may be rendered safe to use by spreading in thin layers exposed to sunshine and wind.

When contaminated by droplets of liquid mustard, Lewisite, or hydrocyanic acid it is best to discard the forage or, if it is much needed, to destroy the outer layers of the pile and decontaminate the remainder, if necessary, by washing. This will not remove all the arsenic but horses are peculiarly tolerant to arsenic.

Where tarpaulins or other canvas is available for covering stores of grain and hay, it affords adequate protection and its use should not be neglected in danger zones.

Many food stuffs, particularly those containing a large percentage of fats, are easily contaminated by chemical warfare agents. Decontamination of such foods is difficult and every practical precaution should be taken to safeguard them. Foods in cans, or other metal containers, are safe from contamination as are also those in tight wooden boxes especially if wrapped, as is the custom, in waxed paper. Buildings, also coverings of treated or waterproofed canvas, offer good but not complete protection. If contaminated with the arsenical agents foods should be destroyed. Those contaminated by droplets of mustard gas can be salvaged if trimmed and aerated promptly. Washing with water or a solution of sodium carbonate will remove much of the poison. Neutralizing agents may render the food unpalatable. Unless large quantities of food are involved, or it is irreplaceable, seriously contaminated food should be discarded; particularly meat, vegetables and fruits.

The protection of army horses from harm during gas attacks devolves primarily upon the riders and drivers and therefore is a responsibility of the commanding officer. The effect of any poisonous gas is dependent upon two conditions — degree of concentration and time of exposure. The attacked can rarely influence the former and the short time during which exposure to high concentrations can be endured make it impossible for the veterinary service to afford protection to more than a few animals. In fact, in attacks that come as a complete surprise, it is doubtful that the animal's attendant can afford it protection against lung irritants. Although a serviceable gas mask for horses has been developed, the soldier must first adjust his own mask and then that of his horse. Even this short delay may be too long.

Although the veterinary officer's advice as to means of affording protection to the army animals against chemical warfare agents must be available to his commanding officer, it is for the treatment of the animals after they are injured that he is directly responsible.

The treatment of animal casualties resulting from chemical warfare depends, of course, upon the extent and nature of the injury; and, these in turn depend upon the agent used and, as already mentioned, upon the concentration to which the animal has been exposed, the duration of the exposure and also the time that has elapsed between exposure and the beginning of treatment. Horses and mules tolerate relatively well certain agents which quickly incapacitate soldiers. Some agents have much the same effect on both soldiers and their mounts. Among the former may be mentioned the lachrymators (tear gas), sternutators (sneeze gas), and gases that cause vomiting. Lung irritants affect animals much as they do men and vesicants act even more severely upon the horse than upon his rider. General therapeusis for animals injured by lung irritants and vesicants are as follows:

Lung Irritants

1. *Phosgene* (carbonyl chloride, palite), CWS symbol CG, is a colorless gas with an odor of ensilage. It is delivered by artillery or mortar shells, projectors and cylinders and it causes coughing, lachrymation, dyspnea and after several hours edema of the lungs.

2. *Chloropicrin* (trichlornitromethane, vomiting gas), CWS symbol PS, is a colorless, volatile liquid with the odor of fly paper or licorice. It may be delivered in the same manner as phosgene and also by spraying from airplanes. The symptoms produced by it are similar to those caused by phosgene but are more severe. In addition skin irritation may be caused by drops or splashes.

3. *Chlorine*, CWS symbol CL, is a greenish yellow gas with a pungent well-known odor. It is delivered from cylinders and projectors and also causes symptoms similar to phosgene but the cough is more distressing. The after effects are more prompt but less toxic than from phosgene.

4. *Mustard*, while this agent when vaporized or inhaled as a mist is a lung irritant its most important effect on animals is as

a skin irritant and the discussion of it is included among vesicants.

Treatment: Since the lung irritants are also eye irritants, early treatment of the eyes is essential. This consists in washing or irrigating the conjunctival sac with solutions of sodium bicarbonate or of boric acid to remove any remaining irritant. They should not be covered. Cocaine is contraindicated; other local anesthetics should be used as required. If conjunctivitis supervenes symptomatic treatment as for conjunctivitis from other causes is indicated.

The immediate effect of lung irritants on the respiratory apparatus is to induce coughing. Except in case of heavy concentrations this symptom may soon disappear and the veterinarian may have to rely upon the history to determine that the animal has been gassed. Exposed to a light concentration, particularly of phosgene, the animal may appear entirely normal for several hours and then sometimes as much as 12 hours after the exposure suddenly develop a fatal edema of the lungs, or die from circulatory collapse preceded by dilation of the right heart. Or, surviving the secondary effects of the gas, the animal may develop pneumonia of a prolonged, mild to fatal type.

The first and most urgent requirement of any animal that has been injured by a lung irritant gas is rest. If this is not provided the case is prone to proceed to a fatal termination regardless of how skillful the other treatment may be. It is important of course to get the animal out of the gassed area as soon as possible but even the urgency of this life-saving measure should not cause the animal to be hurried. It should be led slowly to a non-contaminated area and there given complete rest for 24 hours. Draft animals should be unhitched and ridden animals unsaddled before they are led quietly from the contaminated surroundings.

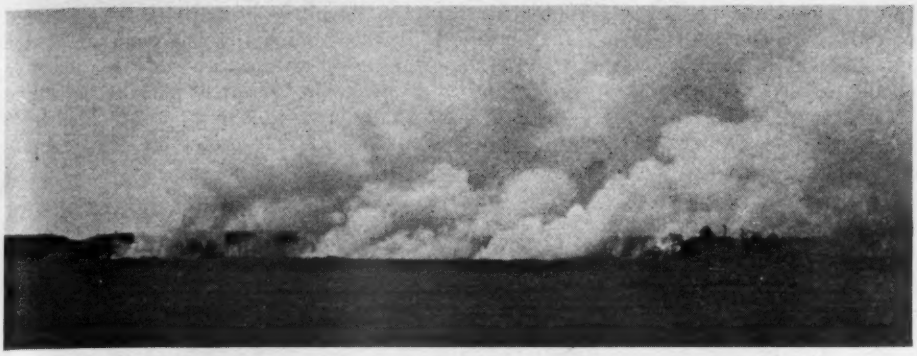
Phosgene damages the lower part of the respiratory system—the endothelial lining of the finer bronchioles and of the alveola. It also injures the capillaries surrounding the air cells, leading to edema, dyspnea and impaired circulation.

Copious bleeding, as soon as the edema of the lungs is in evidence, has attained considerable popularity for this type of gas poisoning. After drawing 4000 to 5000cc of blood, that which remains in the blood vessels is thinned through abstraction of fluid from the tissues. That this facilitates the passage of blood through the injured capillaries is the theory upon which venesection is based. A number of other postulates have been offered to explain the improvement that sometimes follows bleeding but none of them will withstand analysis in the light of known physiological principles. Other than bleeding, upon the value which there is not a unanimity of opinion, the treatment of edema of the lungs following exposure to lung irritants is supportive and symptomatic. Continued rest is of course a prime requisite.

The effect of chloropicrin differs from phosgene only in degree (chloropicrin being less toxic but more persistent than phosgene), and the treatment is the same.

The effect of chlorine gas differs from phosgene and chloropicrin in that it has an immediate and extremely irritating effect upon the respiratory mucous membrane. It occasions a distressing and continued cough and much pain in the chest accompanied by a sense of suffocation. High concentration, because of its great

chemical activity, affects only the upper respiratory tract, constriction of the bronchioles prevents the gas from reaching the lungs. Death may occur within a short period from edema of the larynx and other respiratory passages. If the animal survives the primary effect, necrosis of the mucous membrane followed by bronchopneumonia commonly occurs. The treatment of poisoning by chlorine gas differs little from the treatment of other lung irritants. As with



AN IMPROVISED SMOKE SCREEN

By the simple expedient of firing the tall dry grass on a river levee soldiers on maneuvers contrived a smoke screen that permitted their withdrawal when attacked by superior "enemy" forces

the others rest is indispensable to a successful outcome.

All the lung irritants prepare the field for secondary bacterial invaders. Pneumonia is a common sequel to gassing.

The gas mask now available for horses affords complete protection against the lung gases. Unlike former gas masks used on horses this interferes scarcely at all with respiration and can be worn by the animal many hours without discomfort, even while working, i. e. ridden at the usual pace. The aim is that it be put onto the animal before it enters a dangerous area and worn whenever there is danger of encountering gas.

Irritant Smokes

Screening smokes consist of fine particles of solids suspended in the air. Their effect is harassing rather than incapacitating although a number of them are conjunctival, nasal and lung irritants. However, if the exposure is short, a few minutes in the open air suffices for recovery. The gas mask affords complete protection against irritant smokes.

Vesicants

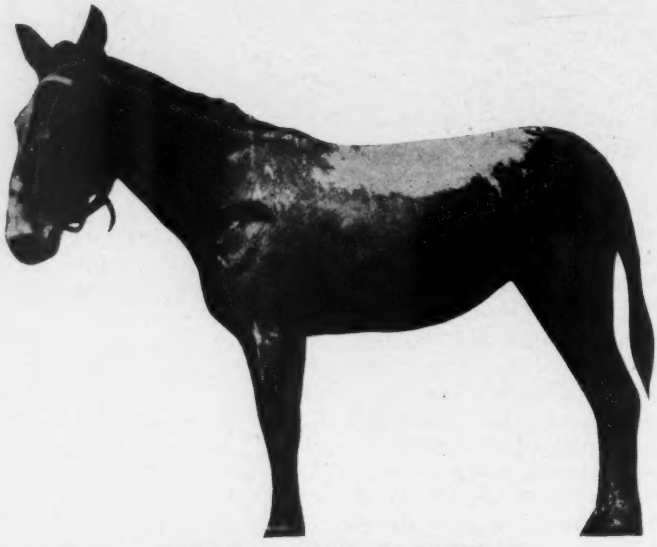
1. *Mustard* (bisbetachlorethysulfide, yperite senfgas), CWS symbol HS, is a dark brown to straw yellow, oily liquid with an odor like that of garlic, or horse radish. It is adapted to delivery by artillery shells and bombs and to spraying from low-flying airplanes or from trucks. The vapor causes delayed irritation of the conjunctiva. Inhaled it causes irritation of the respiratory tract. Neither the effect of vapor on the eyes nor on the lungs is ordinarily serious in horses. However minute droplets striking the eye cause intense inflammation, ulceration and often blindness. Inhaled in the form of a mist, mustard leads to destruction of the respiratory mucous membrane and early death from suffocation. Or if the animal survives the primary injury, secondary infection develops, the prognosis of which is unfavorable. When the liquid reaches the skin in droplets or larger amounts it causes deep destruction of the tissues. When ingested on forage or when grazing, it causes severe stomatitis, pharyngitis and enteritis.

2. Lewisite (betachlorvinyldichlorarsine), CWS symbol M-1, is a colorless to brownish liquid with the odor of geraniums. It may be dispersed in the same manner as mustard and the symptoms are similar to those caused by mustard. In addition there is a possibility of systemic arsenic poisoning where a high concentration of the vapor is inhaled or a large area of the surface of the body is contaminated by Lewisite in liquid form.

Treatment.—Specific treatment for the vesicants consists of neutralizing or removing the poison. This constitutes adequate treatment where it can be accomplished early enough but their action on the skin is so rapid that to be completely successful it must be accomplished within 10 minutes and therefore needs to be carried out by

the animal attendant. Neutralization of the poison up to two hours after it has been splashed on the skin is of some value and should not be neglected as the first step in treatment.

Lewisite is easily neutralized by alkaline solutions; a 5% solution of sodium carbonate is recommended. Mustard is difficult to neutralize. The reaction of chlorinated lime with mustard produces great heat and this agent is suitable only for decontaminating ground areas, bushes, paths, etc. Bleach paste (bleach 50 parts, water 50 parts) and bleach ointment, much used in the treatment of man, may injure the skin of the horse even more than the mustard if not promptly removed. Its use on horses is not advised, except under the direction of a veterinary officer. Carbon tetrachloride, kerosene and gasoline are useful to dilute and in part effect the removal of mustard from the animal's coat. It should be applied with sponges and sopped up. Rubbing distributes the irritant and increases the size of the slough. Contaminated areas should be washed thoroughly with soap and water after the solvent is used; or if a solvent is not available the areas should be wiped carefully and then washed. If bleach is used the paste is preferable to the ointment. It requires to be thoroughly rubbed into the coat at the site of contamination and washed off within five minutes.



MUSTARD DERMATITIS IN A MULE

Burns such as this are usually from contaminated saddle blankets or pack saddles or from covering the animals after droplets of mustard have fallen on the coat. During World War I veterinary evacuation stations received many such cases carded as "mange." The true nature of the condition might not be revealed for a week. Mustard burns on the back of animals were usually the result of dripping of the irritant from overhead branches of trees. Frightful burns of the sheath resulted from traversing contaminated shrub land. The concentrated irritant in shell holes inflicted fatal injury to pasterns and fetlocks

Mustard has been termed "King of war gases." It is inexpensive, can be manufactured in any required amount, is easily dispersed and is very persistent, (it persists for weeks or even months under favorable circumstances) and acts energetically. A droplet the size of a pin head on the coat of a horse will destroy the underlying skin over an area larger than a half-dollar coin. This section of skin will slough and the wound may require months to heal. Contaminated saddles, blankets, harness, anything that comes in contact with the animal may injure it after days or weeks if not decontaminated.

Cavalry animals are particularly endangered by mustard. It is used by troops on areas they do not expect to occupy. Thus if a withdrawal is being carried out the area may be sprayed with mustard by airplanes or tank trucks as a deterrent and hazard to pursuing troops. It is conceivable that critical flank approaches to a line of march or to important installations such as bridges or rail junctions might under some conditions be protected by mustard.

Mustard in liquid form may be sprayed upon animals by airplanes or drip upon them from overhead trees, or may be brushed off tall vegetation. It may reach the extremities from grass or small pools. Contaminated forage or pastures may be a source of injury to the mouth and intestinal tract of a horse. The decontamination of forage has been mentioned. Pastures are safe after heavy rains or several days of warm sunshine.

The coat is roughened; i.e., the hair stands erect on contaminated areas an hour after contact with mustard. After 10 to 15 hours extensive edema occurs which subsides after one to three days and the injured area becomes harder than normal. In another 10 days the hardened plaque of skin begins to separate, at the circumference, from the normal skin. In the course of about three weeks the mummified skin detaches from the underlying tissue and is cast off. The wound that remains is indolent and prone to secondary infection.

Picket lines and other concentrations of animals constitute attractive installations for gassing. The usual requirements of camouflage, where they can be met, afford considerable protection. In addition the horse gas mask, as already mentioned, affords complete protection against inhalation of mustard or other war gases. An eye shield has been developed for protection against overhead spray. The ordinary horse cover affords adequate protection to the body if it be removed and decontaminated within 15 to 20 minutes after contact with mustard. A pervious cover is preferable to an impervious one since it can be worn with much less discomfort to the animal. Leggings of impervious material have been developed that protect the legs from the body to the hoof. Leggings were used in World War I but were not satisfactory. It is thought the new type overcomes the disadvantages of the older style, however, the British Army relies on a protective ointment for the feet and legs. A disadvantage of the ointment is the frequency with which it must be renewed on the heels and pasterns.

These protective devices are designed to be worn continuously when the danger of gassing is regarded as imminent or when traversing gassed areas.

In the treatment of established injury, removal of the mummified skin by excising is not advised. If the injury is slight, healing will proceed underneath it and when the plaque is exfoliated the wound will be practically well. In graver cases loosening of the injured part is encouraged by the application of cod liver oil, glycerine or packs wet in mild antiseptic solution. The use of astringents after the necrotic tissue is exfoliated is contraindicated. Applications that stimulate granulation, such as 1% solution of phenol, are desirable. Secondary infection should be prevented by protective coverings, if necessary, rather than by the use of antiseptics.

About 40 chemical warfare agents were used in World War I and an equal number have been developed since. However there are fewer than a dozen that are really important. The foregoing are representative of the various classes of important agents harmful to animals. Most of the important gases have a characteristic odor by which they may be identified if pure but since two or more poisons are often mixed and further the odor of any gas is easily disguised by harmless substances the odor test is unreliable. All larger organizations have Chemical Warfare Officers whose responsibilities include identification of chemical warfare agents. The decontamination of areas, buildings and inanimate objects other than food is also his responsibility. In measures for decontamination of food and the protection and treatment of animals the veterinary officer can usually obtain essential information from the chemical warfare service of his organization.

The Results Obtained with Tyrothricin in the Treatment of 157 Cows with Streptococcic Mastitis*

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THE only practical procedure available to dairymen for ridding their herds of streptococcic mastitis has been the elimination of all the infected cows. This has been an economic burden to the dairy industry. The discovery of tyrothricin (gramicidin) in 1939 by Dubos[3] and the favorable results obtained by investigators [1, 2, 4, 5, 6, 7, 8, 9, 10] in preliminary experiments, employing it as an udder infusion, suggested the possibility of saving many cows for continued profitable milk production.

Dosage of Tyrothricin

The udders of two, non-infected cows were infused repeatedly—allowing a return to normal between infusions—with different preparations of tyrothricin[4] and control mixtures to determine the quantity of drug that would produce the least irritation to the udder. These same tyrothricin solutions were infused into the udders of 10 cows with streptococcic mastitis to determine the dosage of tyrothricin that would yield the largest number of recoveries with the fewest treatments. These 10 infected cows included large udders and small udders. The least irritating dose of tyrothricin (as determined by the effect on the amount and character of milk) that eliminated the streptococcus infection from the udders (irrespective of size) with the fewest treatments was 150 milligrams per quarter. The cows receiving less tyrothricin (50 or 100mg per quarter) exhibited just as much irritation of the udder as did those treated with 150mg per quarter and required as many treatments to effect recovery. The use of 200, 250 and 300mg per quarter resulted in a decided reaction, indicated by "garget" or flakes in the milk and reduction in the amount produced. The 300mg dose produced the most irritation.

When each of two infected quarters of a cow were infused with 150mg and the two opposite streptococcus infected quarters were each treated with 200, 250, or 300mg usually the same number of infusions were required in all quarters to eliminate the infection. Therefore, a dosage of 150mg per quarter (600mg per cow) was used in the succeeding part of this study to treat cows in all stages of lactation.

The Preparation of Tyrothricin for Treatment

The 600mg of tyrothricin (powder) were dissolved in approximately 5cc of 95% alcohol in small two-dram vials and sealed with paraffin. These concentrated alcohol solutions did not deteriorate during the period of this study (1½ years). The contents of one vial of tyrothricin concentrate (after shaking) were added to a convenient quantity (usually 100cc) of sterile tap water just before treating a cow. A milky appearing colloidal solution of tyrothricin results. Approximately 25cc of this preparation was infused aseptically into each of the four quarters of an infected cow after removing all milk from the udder by complete milking.

Quantities up to 500cc, containing the same dosage, may be infused per quarter without producing severe irritation of the udder due to the larger volume of fluid used. The introduction of more than 500cc per quarter resulted in marked irritation.

The use of sterile mineral oil as a vehicle for administering the tyrothricin proved more irritating than the aqueous solutions. The administration of mineral oil preparations—containing the same amount of tyrothricin—was followed by marked swelling of the udder and garget lasting ap-

*Journal article No. 589, new series, from the Michigan Agricultural Experiment Station. The tyrothricin (gramicidin) was furnished by Parke, Davis and Co., Detroit, Michigan.
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proximately four days, then flakes in the milk for five to seven additional days, instead of abnormal milk for a total of approximately only five days as was the case when the water solutions were used.

Technic of Infusing the Udder

All milk was removed from the udder by complete milking. The udder infusion was applied by gravity flow with an intravenous outfit. The end of the intravenous tubing was fitted with a one-inch section of glass tubing to permit attachment of a short rubber tubing that was slipped over the retaining flange of an ordinary milk tube.

FIG. 1. CLEANSING THE UDDER

For proper collection of milk samples for microscopic examination the udder and teats are first washed with chlorine solution (200 parts per million of available chlorine) to exclude possibility of contamination of the sample with fecal or other streptococci that may be on the surface of the udder and which under the microscope look like the mastitis streptococci. Especial attention should be given to the tip of the teat.

FIG. 2. MILKING INTO A STRIP CUP

Immediately following cleansing of the udder with chlorine solution, the foremilk from each quarter is milked out to flush the teat canal. This milk goes into a strip cup for observation of its physical character and to prevent contamination of the floor

FIG. 3. MILKING INTO A TEST TUBE

After preparation as described in Fig. 1 and 2, a sample is collected by milking directly into a sterile vial (note the manner of holding the cork between the index and second fingers to prevent contamination). This test is used in selecting the cows for treatment and to check for recovery after treatment

A sterile milk tube was used for each quarter. The flow was controlled by a rubber tubing clamp. Each quarter was thoroughly massaged immediately following the infusion. The drug should be permitted to remain in the udder a minimum of six hours. In no case did recovery result when the contact period was less than six hours. The tyrothricin can most conveniently be left in the udder until the next milking providing the period exceeds six hours. The milk should not be used for human food so long as it is of abnormal physical character.

Selection of Suitable Subjects for Treatment

The streptococcus infection of the udder was established by the microscopic test; that is, streptococci were found upon microscopic examination of properly collected milk samples after 12 hours of incubation at 37°C. This test was also used to determine the status of each cow.

To determine whether infected cows advanced to the stage of having scar or indurated tissue in the udder would respond to this treatment, five cows with no udder induration and five cows with marked udder

indurations were treated by infusing each quarter with 150mg of tyrothricin. The cows with marked induration did not recover even though the infusions were repeated four times in three cows, and five times in two cows. Four of the cows with no udder induration responded with one treatment while the fifth required three treatments. The cases treated in the subsequent work were cows detected as being infected by the microscopic test but free from indurative changes of the udder as determined by a careful physical examination.

The Number of Quarters Per Cow Treated

In preliminary experiments only the infected quarters were treated with tyrothricin. This was uniformly discouraging to the dairyman, since during the time of applying the quarter infusions the infection frequently spread to other quarters of the udder making it necessary to subject the cow to repeated udder infusions with the coincident drop in milk production.

A survey made of 67 cows with streptococcic mastitis to determine the number of infected quarters per cow revealed that 49 were infected in all four quarters, three in three quarters, seven in two quarters, and only eight in one quarter. Therefore, all four quarters of a cow were treated when a properly collected composite milk sample upon examination revealed the presence of streptococci.

The Results of Treating 157 Infected Cows with Tyrothricin

We desire to acknowledge with gratitude the assistance of 17 practicing veterinarians in three states for their cooperation in this work with the infected cattle on 46 farms. One hundred and thirty-nine cows with chronic streptococcic mastitis, selected as favorable subjects for treatment, were treated with tyrothricin by infusing each quarter with 150mg of the drug. Recoveries were obtained in 105 of these cows with one treatment, in 25 with two treatments, eight with three, and one required four treatments. Ten cows that had been selected as suitable subjects for treatment, according to the methods outlined, were repeatedly treated (three or four times) with tyrothricin by udder infusion but did not recover.

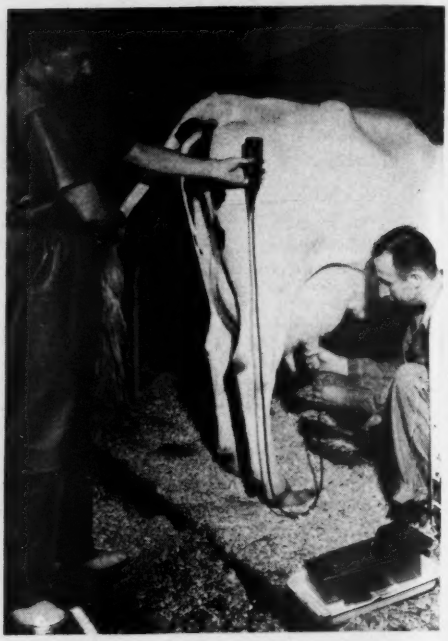

FIG. 4. GIVING THE UDDER INFUSION
The apparatus and technic for infusing the udder are described in the text. A sterile milk tube is used for each quarter. Note the sterile milk tubes in the container and the ones that have been used in the tray. The same procedure (Fig. 1) is followed in the preparation for udder infusion. After all of the milk is removed the infusion is made

Two cows were treated at the time they had acute local streptococcic mastitis and both responded to treatment. One of these required two and the other three udder infusions. In both cases the period of producing "gargety" milk persisted until one week after the last treatment administered to each cow.

One cow suffering from acute systemic streptococcic mastitis was treated once while sick. The udder infusion aggravated all systemic symptoms. Symptomatic treatment was instituted and udder infusions were resumed when the systemic symptoms had abated. Four udder infusions were required to yield recovery from the streptococcic mastitis in this case.

Therefore, of the 152 cases described

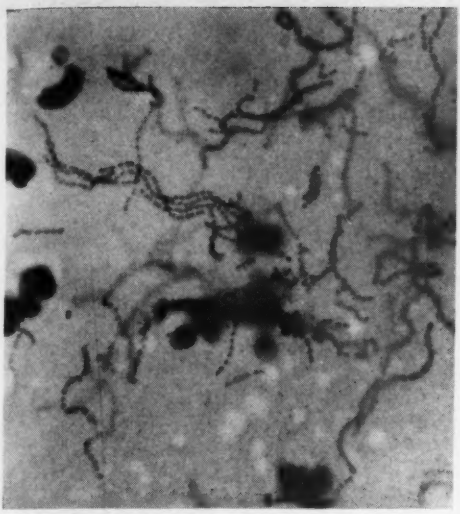

Fig. 5. Infected milk: Streptococci and leucocytes in excess of one million per cc. X 1500

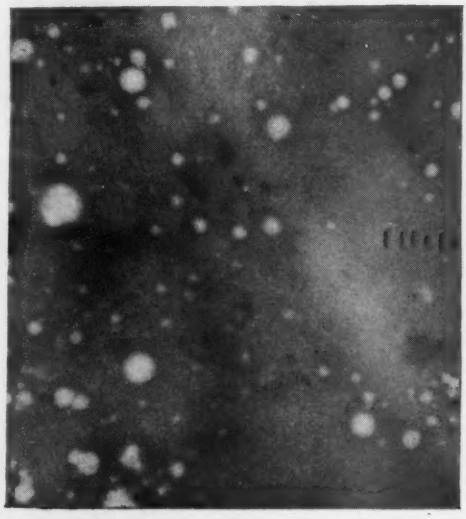

Fig. 6. The microscopic appearance of high-grade milk produced by a cow free from udder infection following treatment and recovery

here plus the five cases with marked udder induration that were treated making a total of 157 cows, 142 or 90 percent were freed from the streptococcic infection of the udder.

The data of Table I demonstrate that the effectiveness of the treatment was not influenced by the length of time that the cows were infected prior to treatment, providing no marked indurations were present in the udder. One cow infected for more than nine years, during which monthly tests were made, recovered with one treatment as did cows infected for one month or less, while a cow infected for only two months required three treatments to get rid of the infection. The cows infected for a number of years prior to treatment without recovering definitely prove that when they are treated and recover (absence of streptococci from the udder) it is actual recovery. These cows have remained free of streptococci organisms since treatment; in three cows this has been 19 months while in the remaining cows less time has elapsed since treatment.

TABLE I.—THE NUMBER OF UDDER INFUSIONS REQUIRED TO BRING ABOUT RECOVERY IN 44 COWS KNOWN TO HAVE BEEN INFECTED FOR PERIODS VARYING FROM TWO WEEKS TO OVER NINE YEARS

Number of Cows	Period infected prior to treatment	Number of treatments required for recovery
1	9+ years	1
2	8 years	1 on each
2	5 years	2 on each
1	4½ years	1
1	4 years	2
4	3 years	1 on 3 cows; 3 on 1 cow
1	2½ years	1
4	2 years	1 on 3 cows; 3 on 1 cow
3	1 year	1 on 1 cow; 2 on 2 cows
1	8 months	1
3	6 months	1 on 1 cow; 2 on 1 cow; 3 on 1 cow
1	5 months	1
2	4 months	1 on each
3	3 months	1 on each
11	2 months	1 on 10 cows: 3 on 1 cow
3	1 month	1 on each
1	2 weeks	1

The Irritant Properties of Tyrothricin to the Udder

The irritating effects of tyrothricin on the udder are indicated by the influence of udder infusion on the milk production and physical character of milk produced by the treated cow. Observations made of 73 cows treated with tyrothricin (150mg per quarter) are presented in Tables II and III. Only three cows did not drop in milk production following treatment, 64 cows or 88% dropped between one and 50%, while only 6 cows or 5% dropped over 50% in the

amount of milk produced at the time of and immediately following treatment. In all cases the milk production returned nearly to normal within three weeks after treatment. The same effect on production was noted in the cows where only the infected quarters—if two or more per cow—were treated as in the cows where all four quarters were treated.

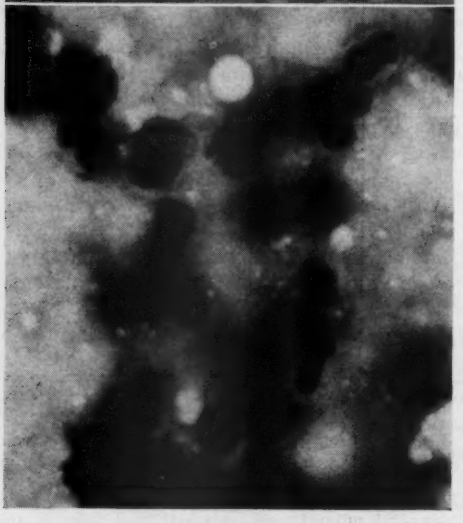

Fig. 7. Infected milk; less than one million leucocytes per cc but streptococci present. X 1500

Fig. 8. Suspected milk; no streptococci but leucocytes in excess of one million per cc (retest within one month). X 1500

TABLE II.—THE EFFECT OF UDDER INFUSION WITH TYROTHRICIN (GRAMICIDIN) ON THE MILK PRODUCTION OF 73 COWS TREATED IN ALL STAGES OF LACTATION

Percentage reduction of milk production after treatment	Number of cows
0	3
1–25	37
25–50	27
50–75	4
75–100	2

TABLE III. — THE NUMBER OF DAYS THAT 73 COWS TREATED (IN ALL STAGES OF LACTATION) PRODUCED ABNORMAL MILK AFTER UDDER INFUSION

Time milk was abnormal after treatment	Number of cows
1 day	2
2 days	11
3 days	8
4 days	13
5 days	23
6 days	5
7 days	7
8 days	2
10 days	1
14 days	1

The period of production of abnormal milk by the same 73 cows after treatment is given in Table III. Fifty-seven or 78% of these cows produced a normal appearing milk within five days after treatment while 16 or 22% of the cows continued to produce flakes in the milk for periods varying from 5 to 14 days. The milk should not be used as food during the time that it is abnormal.

The Effect of Tyrothricin Treatment Upon the Quality of Milk

The bacteriological quality of milk is greatly reduced after udder infection as compared to the quality of milk produced prior to infection.[2] Naturally it was desirable to determine whether the recovery of the cow from the streptococcic mastitis re-

TABLE IV.—THE REDUCTION IN STANDARD PLATE BACTERIA COUNT OF MILK SECRETED BY COWS THAT RECOVERED (BECAME FREE OF STREPTOCOCCUS INFECTION OF UDDER) AS A RESULT OF UDDER INFUSION WITH TYROTHRICIN

Cow Number	Number of Udder Infusions	Standard plate count per c.c. of milk: Average before infusion	Standard plate count per c.c. of milk: Average after infusion	Percentage Reduction of Bacteria count
1	1	140,000	1,650	99
2	2	68,000	1,000	98.5
3	2	92,000	13,000	86
4	4	155,000	33,000	78
5	4	42,800	12,500	71
6	3	612,000	190,000	69
7	2	232,000	100,000	57
8	3	106,000	60,000	44
9	1	3,400	2,400	30

sults in an improvement in the quality of milk produced. Data of bacteria counts of milk from infected cows before treatment and that of milk produced after recovery are presented in Table IV. The percentage reduction of bacteria counts of milk varied from 30% for the lowest to 99% for the greatest reduction. The remaining eight cows fall between these figures. The number of infusions required to effect recovery was not correlated with the percentage reduction in the bacteria count.

Summary

One hundred and fifty-seven cows with streptococcic mastitis were treated by infusing each quarter with 150mg of tyrothricin. Of these 142 or 90% became free from the streptococcic infection of the udder.

Three cows did not drop in milk production upon treatment while 64 produced from 1% to 50% less milk, and only six cows of 73 dropped between 50 and 90% in production. All returned to approximately normal milk flow within 21 days.

The period of abnormal milk production after treatment of 73 cows was less than five days for 57 cows and more than five days but less than 14 days for the remaining 16 cows.

The standard plate bacteria count of milk produced by 10 cows before treatment and upon recovery after treatment yielded reductions in bacteria count varying from 30 to 99%.

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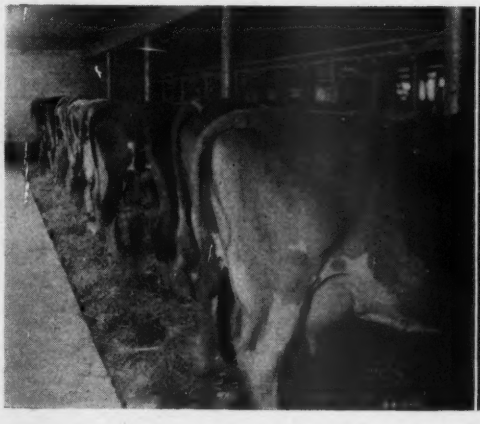

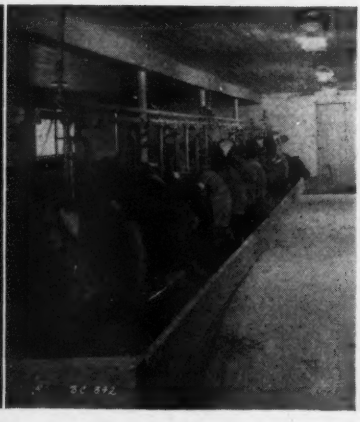

Studies on Congenital Transmission of Equine Infectious Anemia

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WHILE experimental evidence reported during the last three decades appears to indicate that transmission of infectious equine anemia under natural conditions occurs principally either by way of the alimentary tract due to ingestion of contaminated material or by means of biting-insect vectors, some investigators have suspected that hereditary transmission may also play a part in its dissemination.

Observations on the effects of the disease in pregnant mares and studies on the possibility of hereditary transmission have been made by a number of workers.

Steinbruchel[1] reported a case in which infectious anemia was apparently transmitted from an infected mare in foal to its offspring. One out of five brood mares served by a stallion showing clinical symptoms suggestive of infectious anemia, developed clinical symptoms suggestive of the disease during pregnancy and foaled a weak colt which also developed clinical symptoms of infectious anemia. The stallion, mare, and colt on necropsy revealed some pathological alterations indicative of infectious anemia. The other four mares and their colts, however, failed to develop any symptoms of infectious anemia. De Koch[2] reported an experiment in which an infected mare delivered a healthy foal. The blood of the foal was subsequently tested for the presence of virus and found to be non-infective.

The Japanese Commission[3] reported evidence to indicate that the virus may be present in the blood of the fetus and in the milk secretion of affected mares.

Lührs[4] also reported evidence to indicate that the milk from infected mares may contain the virus.

Scott[5] reported the action of the virus on five infected mares in foal. Abortion occurred in three of the animals following severe onsets of fever, while the two remaining mares each foaled an apparently normal colt. Subsequent horse inoculation tests with the blood of these colts indicated the probability that one was a virus carrier and the other was not infected.

Andrievskii[6] reported the occurrence of numerous abortions in an outbreak of infectious anemia among 600 naturally or artificially inseminated brood mares. The abortions occurred during or immediately following febrile attacks and only in those mares that contracted the disease. It was concluded that abortions were due to infectious anemia since the presence of *Salmonella abortivoequina* could not be demonstrated.

Kelser[7] reported a severe outbreak of infectious anemia in a group of approximately 100 brood mares of the U. S. Army Remount Depot at Fort Robinson, Nebraska. Although 28 cases occurred in the mares, only one case developed in the colts which were obviously very closely associated with them.

Trautwein and Schmidt[8] reported the occurrence of five cases of infectious ane-

[1] Steinbruchel, C., 1920. Ein Beitrag zur Klärung der Frage der Übertragbarkeit von ansteckender Blutarmut, *Zeitschrift fur Veterinärkunde*, 32:11, pp. 315-319.

[2] De Koch, G. W., 1923. A contribution to the study of the virus, haematology, and pathology of infectious anemia of equines under South African conditions, *Union of South Africa, Department of Agriculture, 9th and 10th Reports of the Director of Veterinary Education and Research*, pp. 253 to 317.

[3] Japanese Commission, Horse Administration Bureau, Tokyo, 1914. Report on the results obtained by the special committee for investigation of infectious anemia of the horse. *Vet. Jnl.* 70:474, pp. 604-627.

[4] Lührs, E., 1919. Die ansteckende Blutarmut der Pferde. *Zeit. f. Veterinärk*, 31, Nos. 10-12.

[5] Scott, J. W., 1924. The experimental transmission of swamp fever or infectious anemia by means of secretions. *University of Wyoming, Agr. Exp. Sta., Bull.* 138, pp. 34-39.

[6] Andrievskii, I. I., Abortion in mares affected with equine infectious anemia. *Sovyet. Vet.* No. 4, pp. 21-22.

[7] Kelser, R. A., 1922. Equine infectious anemia. *J.A.V.M.A.* 62:3, pp. 319-331.

[8] Trautwein, K., and W. Schmidt, 1940. Ansteckende Blutarmut bei Fohlen. *Zeit. Infekt. Kr. Haustiere* 56, pp. 175-189.

mia in 10 foals from infected mares; also that 10 of 25 fetuses which were 176 to 336 days old from infected mares revealed lesions on necropsy indicative of infectious anemia. The disease in foals spread rapidly under grazing conditions and in all respects was similar to the infection in adult animals.

Heath[9] reported that the offspring of an immune carrier of the disease has little or no immunity to artificial infection and that no hereditary factors could be found to explain the natural immunity to artificial infections that is occasionally encountered.

In a personal communication dated January 12, 1942, from Dr. W. E. Gates, Clarksdale, Mississippi, the following observations were reported relative to an outbreak of infectious anemia in brood mares:

"Nine brood mares with colts at side presented all the usual symptoms of swamp fever, and eight of them died. The colts showed typical swamp fever symptoms, including rise of temperature, swellings, and hemorrhages in the mucous membranes. Eight of the colts died before they were six months old."

In our previous experience with this aspect of the disease, we have observed that abortion occurred following several intermittent febrile attacks in one mare that had been artificially infected after becoming pregnant. However, in this case it was not definitely established that abortion was due to infectious anemia.

The history associated with the recurrence of infectious anemia outbreaks in some instances suggests that such outbreaks may depend upon the presence of carriers and their infected offspring in the areas affected.

To assist in formulating effective control measures against the disease, it appeared highly desirable to determine what role, if any, hereditary transmission may play in the perpetuation and dissemination of the disease. The experiments reported in this paper accordingly were designed and carried out for the purpose of obtaining additional information on this question.

The experiments were carried out during 1940 and 1941 by the Pathological Division at the Animal Disease Station, Beltsville Research Center, Beltsville, Md.

Materials and Methods

The strains of virus used in these experiments were obtained from horses experimentally infected with strains of virus originally isolated from field cases of infectious anemia in outbreaks occurring in New York, Virginia, and California.

The susceptible horses used in these experiments were of the light type, 900 to 1,100 pounds, and were held under observation in screened isolation stables provided with concrete floors and screened vestibules. As far as can be determined, none of the normal horses had any previous contact with horses affected with infectious anemia. Temperatures on all test animals were taken and recorded at least twice daily. Special precautions were taken to exclude all possibilities of accidental transmission.

The pregnant brood mares used in these experiments were impregnated six to eight months prior to being exposed to virus, while the normal stallion used in the breeding experiments was a vigorous, 3½-year-old animal born and raised in an isolated breeding unit at the experiment station.

The normal colt used in the nursing (milk feeding) transmission experiment was 30 days old, having been foaled August 8, 1940, and nursed by its own dam for 30 days, when it was moved to an isolation stable and placed in a box stall adjoining one occupied by an infected mare which

[9] Heath, L. M., Research on swamp fever or infectious equine anemia, Appendix 4, Pathological Division Report, *Report of the Veterinary Director General for the year ending March 31, 1931, Department of Agriculture, Canada.*

Top: Two-year-old gelding on 4th day of attack of infectious anemia, showing depression, rapid loss of condition, weak pulse and lameness. The temperature was 102.4°F., the eyelids partly closed and the mucous membranes anemic. Gait unsteady

Second from top: Three-year-old filly. Temperature 103°F. Hemoglobin 60% on tallquist scale

Third from top: Six-year-old mare. Dam of filly above. Temperature 104°F. Anus relaxed. Weaved when she walked. Hemoglobin 50%

Bottom: The mare shown above two weeks later when recovery was apparently complete

Photos by Dr. E. E. Chamber

it was permitted to nurse three to five times daily for a period of 25 days.

In the breeding experiments involving the normal stallion and infected mares, the stallion was moved from an isolation stable to a small paddock adjoining the isolation stable where the infected mares were kept and was then permitted to serve the mares.

Collection of Milk from Mares

The samples of milk from infected mares tested for the presence of virus were collected as follows: After the udder of each mare had been thoroughly cleansed with 1 to 500 solution of mercuric chloride in 50% alcohol, the milk was collected by stripping into a sterile beaker.

The milk sample from one mare was collected the day following parturition and was held for two days under refrigeration before being inoculated, while the milk sample from the other mare was collected at two different times, the first portion on the third day and the second portion on the fourth day subsequent to foaling, on which day the entire amount was inoculated.

Collection of Semen from Stallion

The sample of semen from the infected stallion tested for the presence of virus was collected as follows: The external genitals of a normal mare and the infected stallion were mechanically cleansed with warm water to eliminate the possibility of contaminating the semen with foreign particles adhering to these organs. The infected stallion was then permitted to make two natural services on the normal mare. Following each service a vaginal speculum was inserted into the vagina of the mare and part of the semen that had

been ejaculated was collected by means of a sterile glass tube connected with a sterile glass syringe.

The semen collected as described above was injected subcutaneously into the normal mare to test for the presence of the virus.

Protocols of Experiments

Table I consists of three sections, A, B, and C. Section A show tests to determine the effect of the virus on pregnant mares; section B shows tests on intrauterine transmission; and section C shows transmission tests with the milk secretion of infected mares.

Table II consists of two sections, A and B. Section A shows the results of attempts to transmit the disease by coitus; and section B shows transmission tests with the semen of an infected stallion.

The following protocols give further information on the tabulated data.

Effect of the Virus On Pregnant Mares and Their Offspring

Experiment No. 1.—Horse 1193, a brood mare pregnant six months, was exposed March 25, 1940, by subcutaneous injection of 30cc of pooled blood serum from six horses affected with infectious anemia, representing three different strains of virus (New York, Virginia, and California). On April 8, 1940, or 14 days following exposure, the mare developed the initial symptoms of infectious anemia. The disease ran a subacute course, and on Sept. 6, 1940, or 151 days subsequent to the appearance of first symptoms and following nine intermittent febrile attacks, the mare delivered a full term but weak colt, the gestation period being 350 days. The weakness of the colt apparently was further increased by the loss of 100cc of blood collected before it was allowed to nurse, and it died in about 24 hours. (Table I, Section A.)

Horse 1194, a brood mare pregnant 8½ months, also was exposed March 25, 1940, by subcutaneous injection of 40cc of defibrinated blood collected from a horse infected with second passage California virus. On April 8, 1940, or 14 days following exposure, the mare developed typical symptoms of infectious anemia. The disease ran a subacute course and on June 1, 1940, or 54 days after the appearance of the initial symptoms and following five intermittent febrile reactions, the mare foaled a full term but weak colt, the gestation period being 324 days. The colt, apparently further weakened by the collection of 70cc of blood before it was permitted to nurse, died about 21 hours after birth. (Table I, Section A.)

Experiment No. 2.—On September 9, 1940, 100cc of whole blood collected from the foal of infected mare 1193 before it had nursed and stored three days at refrigerator temperature was injected subcutaneously into normal horse 1148, to test for the presence of virus. On September 20, 1940, or 11 days after exposure, horse 1148 developed symptoms of infectious anemia. The disease ran a typical, acute course in this animal and terminated fatally 30 days after the appearance of the initial symptoms. (Table I, Section B.)

On June 5, 1940, 70cc of whole blood collected from the foal of infected mare 1194 before it had nursed and stored three days at refrigerator temperature, was injected subcutaneously into normal horse 1107 to test for the presence of virus. Although temperatures were taken twice daily and the animal was held under observation for 96 days, no symptoms of infectious anemia developed. The susceptibility of normal horse 1107 was in turn confirmed by subinoculation of blood from the infected mare 1194. (Table I, Section B.)

Experiment No. 3.—On September 9, 1940, 150cc of the milk secretion collected September 7, 1940, from infected mare 1193 was inoculated subcutaneously into normal horse 845 to test for the presence of virus. On September 26, 1940, or 17 days following injection of the milk, horse 845 developed symptoms of infectious anemia. The disease ran an acute course and terminated fatally 25 days following the appearance of the initial symptoms. (Table I, Section C.)

On June 5, 1940, 200cc of the milk secretion collected June 4, 1940, from infected mare 1194 was inoculated subcutaneously into normal horse 1214 to test for the presence of virus. On June 14, 1940, or nine days subsequent to injection of the milk, horse 1214 developed symptoms of acute infectious

anemia which terminated in death in 10 days. (Table I, Section C.)

On September 7, 1940, a normal, 30-day colt, which had nursed its own dam since birth on August 8, 1940, was moved to an isolation barn containing infected mare 1193. The colt was kept in a separate box stall and allowed to nurse the infected mare three to five times daily for a period of 25 days. On September 18, 1940, or 11 days after first nursing the infected mare, the colt developed a mild febrile reaction which lasted for four days. On September 23, 1940, or 16 days after first nursing the infected mare, the colt developed a second mild febrile reaction and an enlarged hock, and was noticeably sluggish. On September 30 the colt became visibly sick and developed a third febrile attack which reached a maximum of 106° F. and persisted until October 7, when the animal died. Post-

TABLE I. TESTS TO DETERMINE THE EFFECT OF THE VIRUS OF EQUINE INFECTIOUS ANEMIA ON PREGNANT MARES AND THEIR OFFSPRING

Section	Purpose of test	Susceptible animal used	Material administered	Method of exposure
A	To determine the effect of the virus on pregnant mares	Mare No. 1193 pregnant 6 months	Pooled blood serum from horses infected with Va., N. Y., and Calif. strains of virus	Subcu. 30cc
		Mare No. 1194 pregnant 8½ months	Defibrinated blood from horse 1040 infected with Calif. virus	Subcu. 40cc
B	To determine if intrauterine transmission occurred in foals from infected mares	Normal horse No. 1148	Whole blood collected from colt of mare 1193 before it had nursed	Subcu. 100cc
		Normal horse No. 1107	Whole blood collected from colt of mare 1194 before it had nursed	Subcu. 70cc
C	To determine if the milk secretion from infected mares contains the virus	Normal horse No. 845	Milk collected from infected mare 1193	Subcu. 150cc
		Normal horse No. 1214	Milk collected from infected mare 1194	Subcu. 200cc
		Normal 30-day-old suckling foal No. C1198	Milk from infected mare 1193	By nursing infected mare 25 days

	Results following administration of material suspected of containing virus	Final results and conclusion
A	Symptoms developed in 14 days. Subacute case	Foaled full-term colt following 9 intermittent febrile reactions. Colt was weak and died in 24 hours
	Symptoms developed in 14 days. Subacute case	Foaled full-term colt following 5 intermittent febrile reactions. Colt was weak and died in 48 hours
B	Symptoms developed in 11 days. Acute case	Positive for infectious anemia. Indicates intrauterine transmission
	No reaction. Symptoms of infectious anemia failed to develop in 96 days.	Negative for intrauterine transmission. Susceptibility of horse 1107 confirmed by exposure to known virus
C	Symptoms developed in 17 days. Acute case. Died 25th day	Positive for presence of virus in the milk
	Symptoms developed in 9 days. Acute case. Died 10th day	Positive for presence of virus in the milk
	Symptoms developed on the 11th day following first nursing. However, the evidence was later complicated by a bacterial infection and after three febrile reactions the colt died on the 19th day after appearance of initial symptoms	On account of complicating bacterial infection, results were indefinite but symptoms, autopsy, histological findings and subinoculation test indicate the probability that infection was transmitted to the colt through nursing the infected mare*

*Evidence was obtained to indicate that filtered blood serum and filtered spleen suspension from colt 1198 when injected into normal horse 1022 produced an inapparent (subclinical) form of the disease. Conclusive evidence of transmission of the inapparent form of infectious anemia to normal horses from which active virus could be obtained, has likewise been demonstrated in similar experiments.

mortem and histological examination revealed pathological alterations suggestive of infectious anemia, as well as evidence of bacterial infection.

A normal horse 1022 was injected with filtered blood serum on October 18, 1940, and filtered saline suspension of spleen on Dec. 28, 1940, collected during autopsy from colt 1198, but no symptoms of infectious anemia developed in horse 1022 during a period of 165 days.

Horse 1022, however, when exposed to known virus by subcutaneous injection, failed to develop symptoms of infectious anemia, which indicated that it either was a carrier before being exposed to the colt material or had acquired an inapparent form of the disease and immunity as a result of injection of the colt material. On the other hand, blood drawn from horse 1022 before it was injected with the serum and the spleen suspension from colt 1198 failed to produce symptoms of infectious anemia when injected subcutaneously into a normal horse, indicating its freedom from virus. It thus appeared that injection of the filtered serum and filtered spleen suspension from colt 1198 into horse 1022 had set up a subclinical form of infectious anemia (Table I).

The evidence indicating that colt 1198 was infected with infectious anemia and that the tissues from colt 1198 when passed to horse 1022 produced an inactive stage of the disease, is further substantiated by experimental data from two similar cases in different experiments previously carried out but unreported.

The first case, horse A, received subcutaneously a high dilution of filtered virus and failed to show any clinical reaction for 97 days. He was then exposed to 10cc of virulent filtered undiluted virus, followed by no clinical reactions for 102 days. These results indicated either that horse A was a subclinical carrier case with immunity before being used or that he had developed an inactive form of the disease in which immunity had been established by the injection of the minute quantity of virus.

Blood drawn from horse A prior to the time he was first used on the experiment when injected into a normal horse caused no clinical reactions for 54 days, indicating horse A's freedom from swamp-fever virus at the time he was first injected. However, blood that was drawn from horse A on the 97th day after being injected with the minute quantity of filtered virus and before receiving the second undiluted exposure, when injected into a normal horse produced a reaction in 21 days, and this was followed by two more reactions. These results indicate the establishment of an inapparent case of swamp fever.

In a second somewhat similar case, the animal was immune to a second exposure of virulent virus. In this case it was necessary to make two passages through horses to establish the presence of virus that produced clinical symptoms.

Transmissibility of Infectious Anemia from Infected Mares to a Normal Stallion During Coitus

Experiment No. 4.—A normal, vigorous, 3½-year-old stallion was bred to infected mare 1193 on November 12, 13, and 15, 1940, and to infected mare 1194 on Nov. 14, 16, 18, 19, 20, and 22, 1940, or a total of nine times to the two infected mares. The stallion was held under observation, but no symptoms of infectious anemia developed during 42 days following the date of the last service.

The stallion was again bred to infected mare 1193 nine times during the period from January 3 to January 21, 1941, and to infected mare 1194 four times from January 7 to January 14, 1941. He was held under observation until July 7, 1941, or for 167 days following the date of last service, but no symptoms of infectious anemia developed. The nonexistence of infection in the stallion was confirmed by injecting 100cc of his blood into susceptible horse 1289, which failed to react within 93 days. The susceptibility of horse 1289 was in turn proved by a reaction in 11 days from a subcutaneous injection of 1cc of known virus.

The susceptibility of the stallion was subsequently established by injecting 25cc of whole blood on July 7, 1941, from a carrier case, horse 856, which had been infected in April, 1935, and which had shown no clinical symptoms of the disease for more than six years. The stallion developed symptoms of infectious anemia 16 days following exposure, indicating its susceptibility and incidentally

demonstrating that the blood of a symptomless carrier remained infective for a period exceeding six years (Table II).

Presence of Virus in the Semen of An Infected Stallion

Experiment No. 5.—On November 13, 1941, normal mare 1325 received two services from infected stallion 1123. Following service, 33cc of semen was collected from the vagina of the mare by means of a sterile glass syringe. Microscopic examination of the semen showed the spermatozoa to be alive and active. The semen was injected subcutaneously into mare 1325 on November 13, 1941. On December 6, 1941, or 23 days following the injection of the semen, mare 1325 developed clinical symptoms of infectious anemia and to date (February 2, 1942) the disease has run a subacute course with three intermittent temperature reactions.

Discussion

In the experiments herein described, conclusive evidence was obtained to indicate that the milk secretion of mares and the semen of stallions affected with infectious anemia may contain the virus. So far as we know, this is the first time the presence of the virus has been demonstrated by horse inoculation test in the semen of an infected stud. It was also established that the infection may be transmitted from an infected mare to its offspring during intrauterine life.

Two pregnant mares experimentally infected failed to abort during or following febrile attacks. Both mares delivered full term but weak colts.

Evidence was obtained to indicate the probability that a normal colt may acquire the disease as a result of nursing an infected mare. Blood and tissue suspensions from such a colt when injected into a normal horse produced an inapparent subclinical form of the disease.

The disease was not transmitted during coitus, when a normal stallion was repeatedly bred to two infected mares.

During these experiments it was incidentally demonstrated that the blood of a carrier that had shown no clinical symptoms for more than six years still contained the virus and was capable of setting up the disease in a susceptible horse.

On the basis of the experimental results obtained, it appears likely that hereditary transmission, that is, transmission of the

TABLE II. TESTS TO DETERMINE IF EQUINE INFECTIOUS ANEMIA MAY BE TRANSMITTED DURING BREEDING PROCEDURES

Section	Purpose of test	Susceptible animal used	Method of exposure	Results following exposure	Final results and conclusion
A	To determine if the infection may be transmitted from infected mares to a susceptible stallion during coitus	Vigorous 3½-year-old susceptible stallion Tag No. 1123	Stallion No. 1123 bred to infected mare 1193 3 times Nov. 12 to 15, 1940. Bred to infected mare 1194 6 times Nov. 14 to 22, 1940. Bred to infected mare 1193 9 times Jan. 3 to 21, 1941. Bred to infected mare 1194 4 times Jan. 6 to 14, 1941.	Stallion No. 1123 held under observation till 1-3-41 or 42 days and temperatures taken twice daily but no symptoms of infectious anemia developed. Held under observation till 7-7-41 or 167 days but no symptoms of infectious anemia developed.	Transmission of disease from infected mares to the stallion during coitus did not occur. Horse inoculation test for presence of virus in the blood of the stallion was negative. Susceptibility of stallion 1123 confirmed by exposure to known virus. Results positive.
B	To determine if the semen of an infected stallion contains the virus	Normal mare Tag No. 1325	Bred to infected stallion 1123 2 times on 11-13-41. Also injected subcu. with 33cc of semen from infected stallion on Nov. 13, 1941.	Dec. 6, 1941, or 23 days following injection of the semen and two services from infected stallion, mare developed typical symptoms of infectious anemia which to date has run a subacute course.	Positive for the presence of the virus in the semen of infected stallion 1123.

disease from the mare to its offspring during intrauterine life, may play an important part in the dissemination of the disease. It also appears highly probable that colts foaled by an infected mare that are not infected at birth may soon acquire the disease by nursing her.

In view of these findings it is evident that mares affected with the disease under no circumstances should be used for breeding purposes.

The fact that the semen of infected stallions may contain the virus also suggests the possibility that susceptible mares impregnated by an infected stallion, as well as their offspring, may acquire the infection from this service.

The fact that the disease may occur in an inapparent form and that clinically recovered carriers may harbor the virus for years without showing visible symptoms indicates that, following an outbreak, the disease may exist in quiescent form for long periods of time without being recognized. This fact, coupled with the fact that the offspring of infected mares may harbor the virus, appears to indicate the likelihood that the infection may be passed on from generation to generation, and thus be perpetuated indefinitely by hereditary transmission. Therefore, the recurrence of outbreaks in certain well-defined localities over a long period of years would seem to be more logically explained by the presence of carriers and their infected offspring than by the possible existence of other sources of virus in nature in those areas.

Summary

Hereditary transmission of infectious anemia is reviewed. Evidence is reported to indicate that transmission of the disease from an infected mare to its offspring may occur during intrauterine life. Conclusive evidence is also reported to indicate that the milk secretion of mares and the semen of stallions affected with infectious anemia may contain the virus. Evidence was obtained to indicate the probability that a normal colt may acquire the disease from nursing an infected mare and that an inapparent form of the disease may be set up in a normal horse by the injection of tissue suspensions from a colt so infected. Virus was demonstrated by a horse inoculation test in the blood of a carrier that had shown no clinical symptoms for more than six years subsequent to acquiring the disease. Attempts to transmit the disease by coitus, by repeatedly breeding a normal stallion to two infected mares, were negative.

* * * *

In ancient times socks or sandals were devised to protect the horny casing of a horse's foot against wear and tear; but there is some evidence that iron horseshoes were used as early as 333 B.C. at the Battle of Issus. They were commonly known by the fifth century and in regular use in the middle ages.

* * * *

Evolution of the Horse

The existence of the three-toed horses in the past acquires a double significance when we remember that every individual one-toed horse of today actually passes through a three-toed stage in its embryonic development.

In a six weeks embryo the limbs are short; two separate bones are present to make the forearm; the wrist and foot are short, and the middle toe is flanked by two other smaller but perfectly formed toes, each complete with the same number of joints as the center toe.

At eight weeks the two side toes are on the way to become mere splints, but they still show the full number of joints. They eventually develop a cross between a nail and a hoof at their tip, and this later grows into a regular hoof.

Not until some weeks after birth do the separate joint surfaces disappear and the three end joints coalesce with each other and with the elongated first joint to form the little buttons that tip the two splint-bones.

Thus the three-toed state occurs twice, in two different ways, in the history of horses. It occurred as a stage in the past history of the race; and it occurs as a stage in the development of every modern one-toed individual; the current stage recapitulates the three-toed past in its own embryo person.—*H. G. Wells*

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

VII. State Work

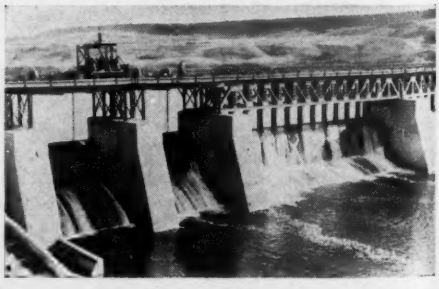
MY next investigation was in central Washington, around the site of the present Grand Coulee dam. Many ranchers had reported the presence of "thick neck," with premature birth in all kinds of livestock.

It took me three days of traveling to make the same trip that now can be made by auto in eight hours. Going to Wenatchee, the famous apple city, by train, I boarded a small steamboat going up the Columbia river. After chugging away all day, I landed at Pateros (puh-terros), where I stayed all night and took the stage the next day for Lakeside, on Lake Chelan, and then took a motor boat to the head of the lake, some 60 miles. This is one of the most beautiful lakes in America, situated in the heart of the Cascade mountains and surrounded by snow-covered peaks and glaciers. Lake Chelan is over a thousand feet deep, with ice-cold, crystal-clear water. Deer could be seen along the upper gulches, while near the snow line there was an occasional mountain goat. I was met at the Stehekin (steeheekin), or head of the lake, by a cattle man, with an extra saddle horse, and we traveled ten more miles up a beautiful valley. Thus, on this one trip, I used the train, steamboat, stage coach, motor boat and saddle horse.

I worked in this community nearly a week, examining all kinds of livestock, and was not long in making a diagnosis of goiter. Samples of the water, soil, feed and specimens of prematurely born calves were brought back to the college for laboratory examination. This is one of the leading goiter belts in America, and even the calcium occurs in the form of an insoluble oxalate. There seems to be an absolute lack of iodine in the water or soil.

My next work was in testing several thousand cattle around Walla Walla, one of the oldest sections of the state, where Marcus Whitman and his family were murdered by the Cayuse Indians nearly a century ago. It was Whitman who wrote back to a friend in the east: "The Oregon country will be good for sheep." That was in 1840. It is too bad he cannot come back now, a century later, and see the millions of sheep thriving on the bunch grass.

Walla Walla is in the midst of a fertile country and is noted as a dairy section. While the climate is quite warm in summer, the terrain is underlaid with abundant springs of water having a temperature around 55°F. the year round. The city is surrounded by majestic scenery. The Blue Mountains, through which the Old Oregon



Huge irrigation dams in the west mean the establishment of thousands of small farms, largely powered by mules or horses. Veterinarians are interested

Trail now winds from the East and Boise, Idaho, to Baker and Pendleton, Oregon, and thence to Portland and the Pacific ocean, is a vast cattle, sheep and mining country. To

In this mining community horses are used for hauling and packing supplies, which makes veterinary practice

the west and north, one can see the Cascade mountains, while to the east are the rugged Seven Devils and Buffalo Hump sections in Idaho.

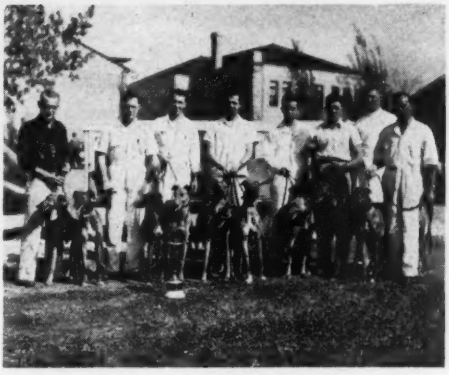
I made my trips around the various farms and dairies by horse and buggy, with a driver furnished by the dairy association. This man knew where everyone lived.

One incident is recalled in which I broke the world's record for the 440-yard dash, on a beautiful Sunday. A number of game cocks fans from Pendleton and Walla Walla were having a big match, and I was invited to the festivities. Everybody threw a dollar into the pot, and this entitled him to all the beer and sandwiches he desired. At the time I did not know it was against the law to hold gamecock fights in the state, but after arriving there with a prominent banker, I was warned to keep quiet if any officers appeared, and to disappear into an adjacent thicket of willows, poplar and alder nearby.

About halfway through the ceremonies, someone fired a revolver and shouted:

"Beat it—the cops!"

As one man, the crowd dispersed, with owners of roosters holding the precious birds close to their palpitating bosoms. Being a fairly fast base runner in those days, I made a quick start and gathered momentum with every stride. Just as I had passed a couple of jack rabbits, and was entering the thicket, I heard a loud laugh and voices urging the wanderers to return. Some practical joker, full of beer, prune juice and homemade apple jack, had given a false alarm. I was greatly astonished at the amount of money wagered on various roosters, with over a thousand dollars on the main event between two "champs." I



The dog I bet on at a race in California was left at the post

won and lost a few bets, being more fortunate than when I attended a dog race in California, where the only dog I bet on was left at the post.

That fall, reports of a curious disease among all kinds of animals, both domesticated and wild, began to come into our office from one of the wildest parts of the northwest—the mountainous corner where Idaho, Oregon and Washington join. Even today that country is so isolated the owls eat with the chickens.

I was sent to investigate the trouble for the state of Washington, and soon ran down the history of the case. Some months before a sheep man had been sent a fine hunting dog by his brother who lived in an eastern state. A few weeks afterwards this dog disappeared, and later on all kinds of animals began to "act queer." One little boy was bitten by his pet dog, and later died. A clinical diagnosis was confirmed by a laboratory examination of the dog's head, and the entire region was quarantined for rabies. Schools were closed, and a general reign of terror took place in that primitive

I have seen rabies in a coyote and even in a bobcat

region, which was without telephone lines or railroads, and only narrow trails for saddle horses. All species of animals were infected. I saw rabies in dogs, cats, horses, cows, sheep, coyotes, squirrels and even a bobcat.

Doctor Nelson told me to stay on the job as long as necessary, and spare no expense in stamping out the epizootic. I spent nearly five months working on this project, and found my newspaper experience invaluable, as I could prepare articles on the disease written in common language. The sheriff and his deputies, who knew everyone in the county, helped immensely.

It was in this campaign I saw the results of cooperation and "being one of the boys." Instead of being an officious "state deppity," they soon found me to be a common human being, eager and anxious to help them. One thing that helped me get acquainted much better in the little county seat of some 600 people was bowling, a sport in which nearly everyone participated. Unless out of town, riding around some ridge where mad animals were reported to have been seen, I would be found every night in the bowling alley, rolling with a regular team.

Allow me to digress long enough to say that "contacts" made in this fashion are quite helpful for any young man. If I had my life to live over, I would learn how to play bridge, golf, and the piano and even learn to dance. These are all valuable aids in getting along in the world, and I think the more "frills" one can have the better. I had one friend who was an expert ventriloquist, while another was an amateur magician. This took little of their time, but it made them the "life of the party." Perhaps this is the best "talking point" for the existence of a fraternity or sorority in our colleges or universities. It gives to the member a better idea of getting along in the world, provided he or she has a modicum of common sense.

One ludicrous incident remains in my memory. It occurred in a small village of some 50 souls, located about 15 miles from the county seat, where a religious revival was going in full blast. In those days, with ordinarily absolutely nothing to do after the sidewalks were taken in at nine o'clock, the revival was the only excitement for miles around.

A couple of mischievous buckaroos or cowboys, with very little to occupy their vacant minds, had asked me how they could make a dog or cat act mad, and stir up a little "whoop 'n holler." I told them they had better not use a dog, as some one might get hurt, but that I had heard a little quinine placed on a cat's tongue would cause it to froth at the mouth. Accordingly, the hotel cat, a friendly old black feline of uncertain age was mustered into service and surreptitiously smuggled into a back seat of the church. Just when the preacher was doing his best to thwart the forces of evil, the cat was turned loose, with jaws snaping and froth pouring from its mouth. A frightened voice yelled:

"Goddle mighty, it's mad!"

The minister gave one look at the confused cat running up the aisle and jumped through a back door, which led into a wood-

shed. From there he started out in the wide open spaces. As the hotel was the nearest place of refuge, he devoted all the coordination of mind, muscle and fast footwork to achieve that desired goal. The cat, of course, was anxious to reach its old ancestral home, and almost, but not quite, kept up with the flying evangelist. As the latter nearly pushed the front door off its hinges trying to gain access to the comfortably heated room, the cat slipped past him into its accustomed corner behind the big wood stove. The preacher called frantically to the landlady to get a gun, as the cat was raving mad.

At this juncture, I stepped in and assured the landlady and the minister that the cat did not exhibit any typical symptoms of rabies, but evidently had something in its mouth (a very safe diagnosis on my part). With dauntless bravery, I picked up the frightened cat, wiped its lips free of froth, and gave him a little water. This brave act did not leak out for nearly six months.

My next task was to investigate "salmon poisoning" in dogs. This is a very peculiar disease, and nothing was known about it except when a dog was "salmoned" once and escaped with its life, it seemed immune to further attacks. The cause has been discovered since to be a fluke, which may attack coyotes, mink, raccoons and other fish-eating animals. I advised the owners to feed their dogs plenty of fresh beef so they would not care to pick up old pieces of salmon. Even today, no sure cure is known, and most cases die getting well.

Next, I was sent to investigate an outbreak among horses and mules, which proved to be the most virulent type of glanders I have ever seen. In those days, when a railroad was built, all the dirt was moved by teams and scrapers, and frequently one outfit would have as high as a thousand head of horses or mules on the job. I remember that over a hundred animals reacted to the mallein test. I have not seen a case in over 20 years. Credit that to the veterinary profession.

From here I was sent to investigate a queer ailment among goats along the Pacific coast. After much work, it was finally diagnosed as takosis. I might say that certain regions of the northwest take their

"Salmon poisoning" has been found to be caused by a fluke. Minks and raccoons are also affected

goat raising quite seriously, as these animals are very useful in clearing up brush land. The Angora is produced for its mohair, and the Toggenburg and Saanen are two popular milk types.

While over here, much trouble had ensued in the Walla Walla country from a queer ailment among horses and mules, commonly known as "walking disease." One large rancher with around one hundred and fifty head, had lost over half of them. I did not get mixed up in this malady, for which I was thankful, as nothing much could be done for it. One owner, state senator, was very unhappy about his losses and threatened to get Doctor Nelson's scalp at the next session of the legislature. However, nothing ever came of it, the Doctor's political scalp being practically non-detachable. Since then this ailment has been called "big liver disease." McCulloch's recent researches point to tar weed seed as a possible cause. It also affects pigs, stunting their growth, and may cause death in severe cases.

Red water in cattle had become a veritable scourge along the coast, and when I had finished working on takosis, I spent a little time on this disease. While the trouble is not known to be contagious, it may come from some fern or spore of mold. I advised owners of affected cattle to keep their animals off the pasture, to feed plenty of oats, iodized salt, and alfalfa, and to give some iron sulphate and whole flaxseed. Where

When I perform an autopsy such as this (big head in sheep) I explain fully to the owner. He knows nothing about it but he thinks he does and that is what counts

followed, this line of prevention seemed to help; but many, of course, could not follow these suggestions. A great deal of valuable work on this disease has been done by the Washington Experiment Station.

While working on this disease, some farm wives asked me to perform autopsies on fowls dead from leucemia or big liver disease. About all I ever discovered was that the victim died when its heart quit beating. (This is the first I have given this great scientific discovery to a waiting world.)

In this connection, can you perform a "smooth-looking autopsy"? Nothing makes a better impression on an owner or the by-standers. They nod their heads approvingly, and say to themselves:

"That feller knows his business."

Doctor Sisson taught me how to perform an autopsy almost with kid gloves on; it is not a messy job if performed properly.

First of all, one should know how to destroy the animal in an easy and humane manner. For horses, I prefer a .25 automatic revolver with a steel-jacketed bullet. When shot in the head the victim is dead before it reaches the ground. A cow can be knocked in the head, as can a pig. For a sheep, lay it on its left side, cut its throat from within to the skin, and pull back the cervical vertebrae by bending the head. The same technic applies to a goat.

I have used a hunting knife, carried in a leather sheath, and find it extremely strong, and it can be kept very sharp. A small hand ax is also carried along for cutting bones, such as the ribs.

I carry a regular grip for postmortem work. It contains an aromatic antiseptic; rubber gloves; wide-mouthed vials; sterile medicine droppers; labels; notebook; pencils; and some formalin solution and powdered boric acid.

If an infectious disease is suspected, we like to get the carcass away from a building, and lay or roll it on some straw, with some old boards under this. A window is made in the side of the carcass, and the ribs chopped away with the small ax. We start in at the bronchi, and examine each organ as we come to it. Explain things fully to the owner. He does not know anything about it, but he thinks he does, and that is what counts. When he recognizes the heart or lungs or even the stomach, compliment him upon his knowledge of anat-

omy. This does you no harm, and makes him feel that he is a natural born scientist.

If the disease is obscure and I know as little about the real cause as the owner, I like to take samples of various tissues and place them in the wide-mouthed vials, with a suitable preservative. One can also take a few drops of blood by means of the medicine droppers.

A description of the place; kind of animal; history of case; postmortem findings; and all other material helpful to the laboratory is then written down.

To determine the presence of suspected stomach worms in sheep, I take an empty ten-quart bucket and place a few layers of gauze over the top. Coming to the fourth stomach and a few inches of duodenum, I cut these open and lay the contents on the gauze. Cold water is then poured over the latter, until all the gastric contents are washed into the bucket. Then I use a small magnifying glass and let the owner take a look at the wriggling mass of brownish-colored worms. He will then be receptive to any suggestions as to treatment.

Pour some old oil over the carcass when the autopsy has been completed and touch a match to the straw. This will at least heat the external tissues. "Biosis," that is to say putrefactive organisms, may do the rest that is needful. Disinfect the rubber shoes; burn or disinfect the gloves; and one is ready for new adventures.

Thus, fresh out of college, with excellent health, youth and an irresponsible disposition to take nothing, including myself, very seriously, I spent two pleasant and instructive years. I had been in every county of the state of Washington, and had become familiar with its various livestock problems. Best of all, I had met many kind and experienced practitioners who were always willing to help out a kid all they could. Many a time in practice later, when I was puzzled over some case of my own, I would remember something one of these "old heads" had told me. I have made many mistakes, but I feel sure I would have made many more had it not been for this wise counsel.

(To be continued)

For dispensing powders to clients, small No. 1 paper sacks will be found useful. One can typewrite the label and attach it to the bottom of the sack, using a small rubber band to keep the sack closed. Sacks cost about fifty cents for 500, while fiber boxes cost around $9.25.—*E. T. B.*

Build up a reputation for being helpful without wanting to rush out on a call every time a client calls up. In many cases, one can suggest some simple remedy, telling the client to call up again if the patient does not improve. Often the phone will ring later, and a voice will say: Well, Doc, you better come out."—*E. T. B.*

Pass the word around quietly you do not charge quite so much for a call when paid cash, and watch your receipts increase with no more apparent business. In our town, the liquor store, the movies, the postoffice and the cash and carry stores all do a rushing business. They have taught the people to lay the mazuma down on the line.—*E. T. B.*

We carry a .22 calibre pistol in our car at all times. With a long-rifle, solid-point cartridge, one can painlessly "put out of the way" any hopelessly sick or injured animal. The average client appreciates this service. In many cases, he does not have the heart to dispatch the animal himself. Inexperienced persons often shoot too low and miss the brain, thus causing a messy nose bleed and additional suffering.—*E. T. B.*

Do you have all your instruments ready for immediate use? Years ago we were called out to see a case of bloat. We had omitted washing and lubricating our only trocar, with the result it "stuck tighter'n a drum." Was our face red? It decidedly was. In the intervening 25 years we have always taken time out after returning from a call to go over all the instruments we used. Also we carry more than one of the commonly used instruments, such as trocars, hypodermic syringes, dose syringes and needles. —*E. T. B.*

Castration Standing

The July issue of VETERINARY MEDICINE contains the finest collection of practical, useful articles I've ever seen. The experience of Doctor Morgan (p. 305), recalls my own in castrating colts. I used a casting harness, very similar to the one he describes for 30 years, but recently in discussing the subject with a young veterinarian from Iowa I decided, at the age of 55, to try the standing operation that he recommended so highly.

The first attempt was made on a big, strong saddle-bred yearling. Everything went according to Hoyle till all was ready

For thirty years I used a casting harness, as illustrated, but at 55 years of age I decided to try the standing operation recommended by a young Iowa veterinarian

and that extra turn is given the twitch just as the incision is made. The colt went stiff as a wooden horse and fell sidewise without flexing the legs and fairly bounced when it hit the ground and lay there—a perfect faint. I jumped upon it and had the first testicle removed before the animal revived.

Exactly the same procedure was gone through in removing the remaining testicle.

The next colt was an unbroken, three-year-old broncho. He didn't faint but a panel of fence directly behind him did. At least it fell over sidewise and bounced when it hit the ground. I congratulated myself that he hadn't kicked in my direction.

The next case for castration was a five-year-old stallion. I was schooled to expect anything by this time, but nothing unusual happened and I proceeded with confidence to my fourth case—a mule. To make it short he is a gelding now.

About twenty more colts have been castrated in the standing position. I got all my surprises but one in the first four cases. The final surprise was the small amount of swelling that has followed this method of castration. In most instances there has been practically no inflammation at all.

Try it.

L. B. MICHAEL

St. Louis, Mo.

Oat Hay Poisoning

Sixteen pure-bred Hereford steers weighing 400 to 500 pounds each were reported dead of unknown cause. Eleven of the animals had died rather early the morning the call came and the bodies were still warm when seen. The animals had not been visibly sick the night before and none showed symptoms of illness when the call was made. The owner wished to know the cause of the deaths. The herd of 350 steers had all been in the feed lot together, had the same water supply and received, per head, a daily grain ration which consisted of the following: One pound oats, three quarters pounds each of linseed oil meal and cotton seed oil meal and four pounds of ground corn. This ration had been augmented by 15 to 18 pounds of ensilage for nine days before the first losses occurred.

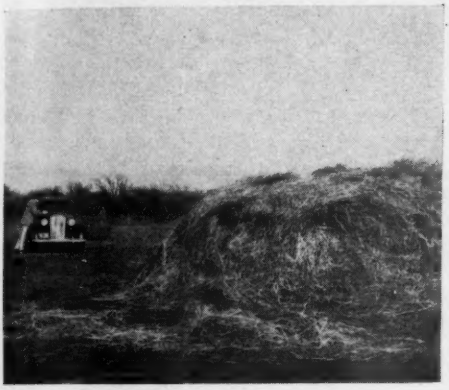
For three days all animals of the herd had been fed approximately four pounds of stacked oat hay per day. A tentative diagnosis of arsenic poisoning had been made earlier by another veterinarian.

Necropsy was held on three of the carcasses. There was no serious bloating. The lungs were congested and dark reddish-brown in color. Both abomasum and omasum showed some signs of inflammation. The jejunum was highly inflamed (of a hemorrhagic-catarrhal nature). The lower bowel was not affected. There were numerous petechial hemorrhages throughout the body and on the epicardium and endocardium, these being quite diffuse in some cases. The muscles surrounding the thoracic inlet were stained a reddish-brown color. The blood was very dark—almost black in color—and watery in consistency.

A tentative diagnosis of forage poison-

ing was made and the owner advised to change the feed completely. The rumen contents of the posted animals were analyzed chemically but no traces of arsenic were found.

Three days later another call came. Eleven more steers had died during the previous night. Postmortem examination of two of the bodies showed the same lesions as in the earlier deaths. The owner had changed the ensilage as advised and had been feeding alfalfa instead of the stacked oats. However, the day before he had again fed the stacked oats and that night suffered the losses. A diagnosis of oat hay poisoning was made and samples of the suspected oat hay were taken to a laboratory.



Oat hay suspected of killing feeder steers. It will be noted it is not stacked in a manner to afford it any protection from rain and weather

The causative agent of oat hay poisoning has been found to be potassium nitrate—known as salt peter. The hay was normal in appearance, being of a bright straw color. There was nothing about it to suggest its poisonous character. The ground on which it was grown had been heavily pastured for fifteen years before.

Oat hay poisoning has been reported several times in Wyoming and Colorado during the past few years, but had not heretofore been reported in Kansas. The theory is that the potassium nitrate contained in the oat hay owes its poisonous properties to the fact that in the digestive tract of the animals it is changed to the nitrite probably through the action of the organisms present, since the digestive juices have no effect upon it. The resulting potassium nitrite upon being absorbed by the blood forms a strong combination with oxygen in which the oxygen is so tied as to be unable to be released to the tissues. This combination of oxygen and potassium nitrite with the blood is known as methemoglobin. It replaces practically all the oxyhemoglobin present and thus the animal is asphyxiated. Methemoglobin is dark chocolate-brown colored and in animals ill or dead from this poisoning it has replaced the normal blood.

FEEDER STEERS

The carcass of one that had died of what was thought to be oat-hay poisoning may be seen in the foreground

Considerable research has been done at the Wyoming Experiment Station to determine the cause of oat hay poisoning. According to these investigators the minimum toxic dose for a plant to be considered poisonous is 1.5% potassium nitrate. With such a low percentage of nitrate, a large amount of this hay would have to be eaten to cause death. However, if a 500-pound animal should eat 5½ pounds of oat hay containing 5% of saltpeter, death would likely ensue. According to these investigators the grain is to be considered harmless and only the hay and straw are potentially poisonous.

Animals fed at the Wyoming Experimental Station with poisonous oat hay exhibited the following symptoms: Difficult high pulse rate, respirations shallow and noisy, mucous membranes cyanotic and the sclera of the eyes showing a brownish tinge.

Treatment, to be effective, must be administered when the first symptoms are evident and oat hay poisoning is suspected. Methylene blue in doses of two grams per 500 pounds of body weight injected intravenously produces favorable results. The methylene blue counteracts the effect of the ingested nitrate by converting the methemoglobin into normally functioning hemoglobin.

A method which might help in the diagnosis of oat hay poisoning is made by drawing a small quantity of blood into a syringe and observing its color. Normal venous blood is dark red and gradually brightens, as it takes up oxygen, until it becomes bright red. In case of nitrate poisoning the blood has become dark chocolate-brown in color and remains so even after long exposure to the oxygen of the air.

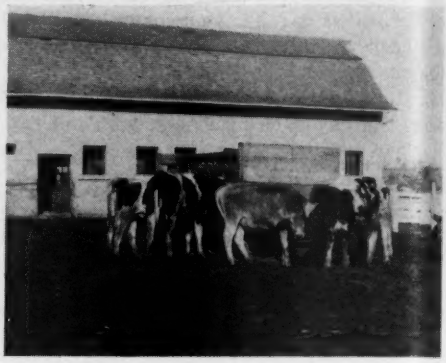
GORDON C. HOWELL.

Columbus, Ohio.

A Baffling Disease of Mid-West Cattle

For the past few years reports on hemoglobinuria in cattle have appeared sporadically in veterinary literature. The following writers have contributed, Schofield,[1] of Guelph, Ontario; Farquharson and Smith,[2] of Colorado; Madsen and Nielsen,[3] Utah and Vawter and Records[4] of Nevada. The latter definitely incriminated *Clostridium hemolyticum-bovis* as the cause of the hemoglobinuria in the western mountainous regions, but so far as known no specific causative factor has been determined for the mid-west disease. Several anaerobic organisms have been suspected of being the etiological agent, *Clostridium welchi* in particular, but proof is lacking. When the disease first appeared in Kansas, it was confused with anaplasmosis by the practitioner, but laboratory examination quickly revealed that this was not a factor. Until further knowledge is gained as to the etiology, authorities are contented to call this disease "obscure plant poisoning."

The disease was first reported from Kansas approximately three years ago and sporadic cases have continued to occur from time to time. Usually only one animal is affected at a time, but in a few cases a high percentage of the animals in a herd suffered from the disease. Frequently, there is a lapse of 30 to 60 days between the first appearance of the disease on the same farm and the occurrence of other cases.



Young calves when affected with this disease show extreme weakness

Animals affected with the disease are first noticed by the owner, to be passing bloody urine. The urine is tinged with dark-brown blood and microscopic examination shows the presence of hemoglobin. The blood is thin and slightly darker than normal. In the early stages of the disease the animals stand around with apparent loss of interest in food and surroundings. Later, they become weaker, assume a recumbent position and show severe anemia. Other general symptoms are anorexia, rapid pulse, labored breathing, high temperature—from 104 to 106°F., and exhausted facial expression.

The malady affects animals of all ages, from calves six weeks of age to old cows. Young calves show extreme weakness, thus causing the exhausted expression to be quite pronounced.

[1] Schofield, F. W., 1941. Nonspecific hemoglobinuria and acute pulmonary emphysema of cattle as essential enterotoxemias. *Jnl. A. V. M. A.*, 99:772, pp. 28-32.

[2] Farquharson, J. and K. W. Smith, 1938. Postparturient hemoglobinuria of cattle. *Jnl. A. V. M. A.*, 93, pp. 37-39.

[3] Madsen, D. E. and H. M. Nielsen, 1939. Parturient hemoglobinemia of dairy cows. *Jnl. A. V. M. A.*, 94, pp. 577-586.

[4] Vawter, L. R. and E. Records, 1926. Ictero-hemoglobinuria of cattle. *Jnl. A. V. M. A.*, 21:4, pp. 494-512.

Urine analysis of cases of this disease yielded 3% hemoglobin and the presence of albumen also has been noted.

The incubation period is not known, however it is believed to be short, judging from

When inoculated with blood or liver extract from active cases the rabbit was not affected

the abrupt course, which is usually less than two weeks. This varies somewhat with the physical condition of the animal and the treatment administered.

Treatment has been varied and to a large extent without success. Some practitioners believe blood transfusions are beneficial, but with the exception of a temporary "lift" in a few cases and possible prolongation of life, its value is questionable. Approximately 15% of affected cattle recover.

On postmortem examination the heart, lungs, spleen, lymph glands, and serous membranes are normal. The liver is normal in appearance, but slightly swollen. The kidneys have a mottled appearance from hemosiderin deposits, and the bladder contains blood tinged urine.

No pathogenic micro-organism has been isolated, from the blood or from liver tissue. The above statement is based on studies by Vawter and Records of Nevada, and Farley of Kansas. If other bacteriologists have been successful in determining the causative factor they have not made their findings public.

Calves, rabbits and guinea-pigs, when inoculated with blood or liver extracts in saline from active cases, failed to show ill effects. Calves weighing approximately 500 pounds were injected intravenously with 30cc of blood from active field cases (one calf was given 300cc). They were checked daily for a period of 30 days for changes in attitude and red and white cell counts but no deviations from normal were found.

The writer believes that the symptoms of this disease more closely resemble those of hemoglobinuria produced by *Cl. hemolyticum-bovis* than does the post parturient hemoglobinuria from a non-specific (possibly) dietary cause. The former will be reviewed according to the findings of Vawter and Records.

Ictero-hemoglobinuria is characterized by sudden onset, rapid course, high temperature, hemoglobinuria and occasionally bowel hemorrhages. Death usually occurs in 24 to 36 hours after the first appearance of definite symptoms. Postmortem examination reveals bloody discharges from the natural body openings. A profusion of hemorrhages occur on the mucous membranes, subcutis and serous surfaces of the viscera and pleura. Hemoglobinuria is constantly observed. One large hemorrhagic infarct is invariably found in the liver, usually located on the upper or lower extremities of the parietal surface.

Summary

1. A disease, hemoglobinuria exists in the mid-west that is entirely different from post parturient hemoglobinuria and the hemoglobinuria produced by *Clostridium hemolyticum-bovis*.

2. The disease affects cattle of all ages and breeds.

3. Postmortem lesions resemble those of other hemoglobinurias. The main differences are absence of the infarct in the liver as described in *Clostridium hemolyticum-bovis* infection and the lack of the advanced degeneration of the parenchymatous organs as observed in postpartum hemoglobinuria.

4. The cause is unknown, but plant poisoning is suspected despite the fact that some cases have occurred in bucket fed, nursing calves and feed-lot cattle.

5. Trypanosomiases have not been ruled out.

ALLEN BRITE

Monett, Mo.

Cases of hemoglobinuria in calves, four to six months of age, were reported in VETERINARY MEDICINE in Nov., 1941, by L. G. Cloud, and T. T. Christian. The treatment used consisted of 100 to 1500cc of a solution of hydrochloric acid intravenously until the urine cleared. At the same time 10cc of rabies vaccine was injected subcutaneously for its hemostatic effect. If the animal was weak 500cc of fresh citrated blood was given intravenously daily as needed. If the temperatures reached 103°F. sulfapyridine (52.5gm) was administered *per os* and repeated in two to four hour periods. Prompt recovery was made in nearly every case treated.

Many of our subscribers tell us that they "like to know what the other fellow is doing and how he is doing it"—you like to read of the other fellow's interesting cases; he also likes to hear of yours. On these pages you may tell the other fellow what you are doing and just how you are doing it.

Watch Your Bulls

A few days after reading Dr. T. A. Sigler's article in VETERINARY MEDICINE in which he advises watching your bulls, my son, myself and the owner had just cast a colt for castration in one of southern W. Va.'s mountain pastures. Suddenly out of a near-by ravine a huge, vicious-looking bull came charging towards us with head down, bellowing furiously. My first impulse was to take to a nearby tree with as much agility as my years would permit. However, just at that moment Rembrandt, Jr., let go with a well-aimed rock with the proper amount of punch behind it. The rock landed just over where a bull's brains would be if he had any. The blow brought our would-be assailant to his knees and when he got back on his feet he was very definitely "addled," or to be scientific he suffered incoordination. However, what walking he was able to do, was done away from where the colt lay tied. The last we saw of him he was staggering towards his concubines on a distant hillside and we completed the operation without further interruption. As usual the owner had insisted that the bull was harmless, but I will always believe that his intentions were murderous. I believe a short-and-easy-to-remember slogan not only for veterinarians but everyone who has anything to do with bulls is "WATCH YOUR BULLS."

REMBRANDT MORGAN

Winfield, W. Va.

Doctor Price of Algona, Iowa, has a bull blinder, for a mean one. The bull can see to graze and get about; his view of the ground in front of him is unobstructed, but he can't see to attack a man or to tear down fences

Another view of Doctor Price's Apparatus

* * * *

Cotton thread can be employed successfully as a suture material if the proper aseptic technics are followed. The cotton selected should be of the greatest tensile strength for the smallest diameter. Boiling the thread to sterilize it increases the tensile strength, if it is used while wet. It may be kept wet by immersion in sterile saline solution; if allowed to dry, it should be dampened just prior to use.

Amputation of Fore Limb in a Dog

A definite technic for the amputation of the front limb of the dog in the veterinary clinic of the Kansas State College affords the operator complete control over hemorrhage, causes less tissue injury and takes less time to complete than the usual method.

The anterior aspect of the shoulder joint and upper humerus of the dog is quite superficial, being covered only by the thin, wide, brachiocephalicus and the distal end of the deltoid muscle. In most operations for amputation at the shoulder joint the amputation proceeds from the more distal end of the limb proximally. The technic above mentioned takes advantage of the superficial position of the bone and the dissecting is done from the proximal end of the limb distally.

General anesthesia is administered after the whole upper arm is shaved and disinfected. The radial vein is ligated at the upper part of the forearm. The skin incision is begun above and posterior to the shoulder joint and down the anterior surface of the arm to the level of the elbow joint, where it is carried back and ended slightly above the point of the elbow. The skin incision made, the shoulder joint is now disarticulated, and the articular surface of the scapula curetted. Then the humerus is dissected readily from its bed by cutting the muscles at their attachments to the bone. The lower muscles are cut through their tendinous attachments to the radius. Cutting into the body of any muscle should be avoided. The principal veins, arteries, and nerves lie medial to the humerus in its natural position, but on freeing the humerus they lie in a posterior position and may be ligated with catgut where they convene above the elbow. When these are cut, and all the muscles have been severed at their attachments, the limb is free.

The skin flaps are sutured with mattress sutures over the remaining pad of muscle. Then the excess skin is removed, leaving a neatly-closed wound incision with drainage at its ventral section. After the wound heals and the arm muscles undergo atrophy, there is little evidence of the operation. This method also eliminates the repulsive stump that remains after amputations lower on the limb.

RICHARD GORMAN

East Hartford, Conn.

Senegal oxen used in St. Croix, V. I.

Brucellosis in the Virgin Islands*

The low percentage of *Brucella abortus* infection in cattle in the Virgin Islands is believed due to the year around dry weather and an excessive amount of sunlight.

The data given are from my records in connection with official work in St. Croix, St. Thomas and St. John, Virgin Islands.

In September, 1939, there were 7,009 cattle in St. Croix. Of that number 1,323 were tested for brucellosis up to May 1, 1940. The School of Tropical Medicine, San Juan, Puerto Rico ran 200 of the blood tests, all of them being negative. Our laboratory in St. Croix ran the remainder (1,123), of which three were positive reactors and two were suspects, making the percentage of infection among the animals tested in St. Croix 0.38%.

St. Thomas and St. John Islands constitute a single municipality and so are grouped together. On September 1, 1939 there were 3,223 cattle on these islands and of these 175 were tested during eight months following. One suspect and one positive reactor were found, making the percentage of infection in tested cattle 1.14% for St. Thomas and St. John. (The St. Croix laboratory ran these blood tests also.)

In the Virgin Islands as a whole, therefore, there were 10,232 cattle, of which 1,498 (15%) were tested for brucellosis with 1,491 negatives, four reactors and three suspects, making the percentage of brucellosis free cattle among those tested 99.53%.

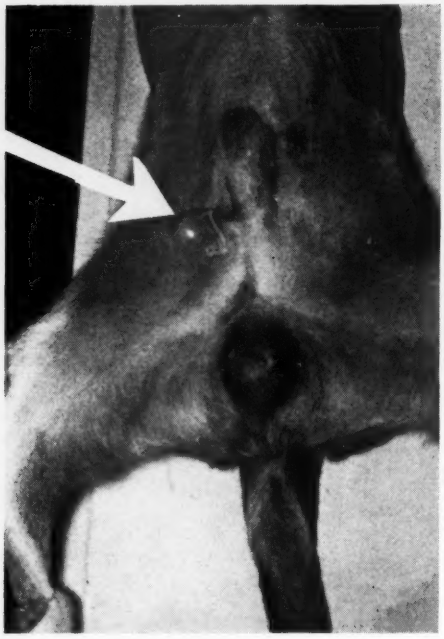
GORDON C. KENDALL

St. Croix, V. I.

*Since making this report, Doctor Kendall has moved to Montgomery, Alabama, and opened a small animal clinic at 1051 S. Decatur.

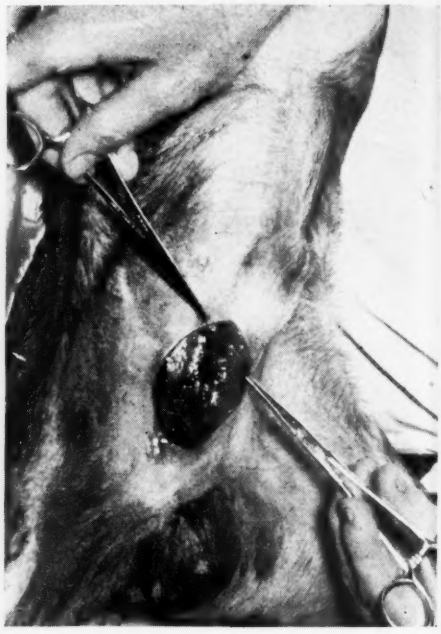
Tumor in the Preputial Region of a Dog

Early in February, 1942, a male, American foxhound, five years of age was presented at C. C. Moore's veterinary hospital at Carthage, Missouri, for examination and treatment. Subsequent examination revealed a tumor-like enlargement anterior to the right subcutaneous inguinal region in apposition with the penis. It protruded approximately three and a half inches and was about an inch and a half in diameter at its base. The growth was unsightly, but was apparently of little concern to the animal since no evidence of pain was manifested during the examination. The growth had appeared about six months previously and had grown larger rapidly. The dog had seemed normal in all other respects.



Note the tumor-like enlargement anterior to the right subcutaneous inguinal region

The animal was prepared for operation using 5cc of nembutal intravenously. An elliptical incision was made on both sides at the base of the growth and then blunt dissection was employed. Considerable hemorrhage was expected but did not occur. After removal of the tumor the wound was sutured with interrupted linen sutures. In three days the patient was sent home with the wound healing satisfactorily by first intention.



An elliptical incision was made on both sides of the growth which was removed by blunt dissection. There was little hemorrhage

This tumor was sectioned in the Veterinary Pathology Department of Kansas State College. The neoplasm was revealed to be composed of large cells having a dark staining nucleus and a comparatively large amount of cytoplasm. There was very little connective tissue stroma. Although the predominating cells differed somewhat in appearance from those usually observed in carcinomas, they nevertheless possessed sufficient epithelial cell characters to be classed as carcinomatous in nature. This is particularly true when we consider the comparatively short period during which the neoplasm developed (6-10 months) and the absence of any appreciable number of recognizable connective tissue cells.

A. D. KIRK.

Akron, Ohio.